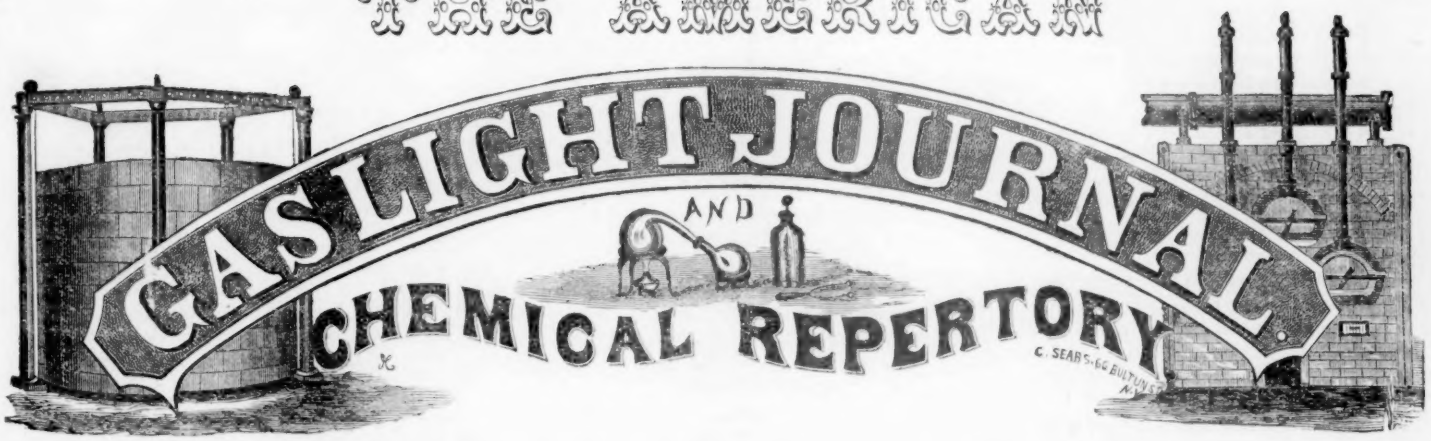
THE AMERICAN



Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science

PUBLISHING OFFICE, No. 22 PINE STREET.

VOLUME XI.—No. 2. | WHOLE No. 230. | NEW YORK, FRIDAY, JULY 16, 1869. | $3 PER ANNUM IN ADVANCE.

The Latest Gas Machine.

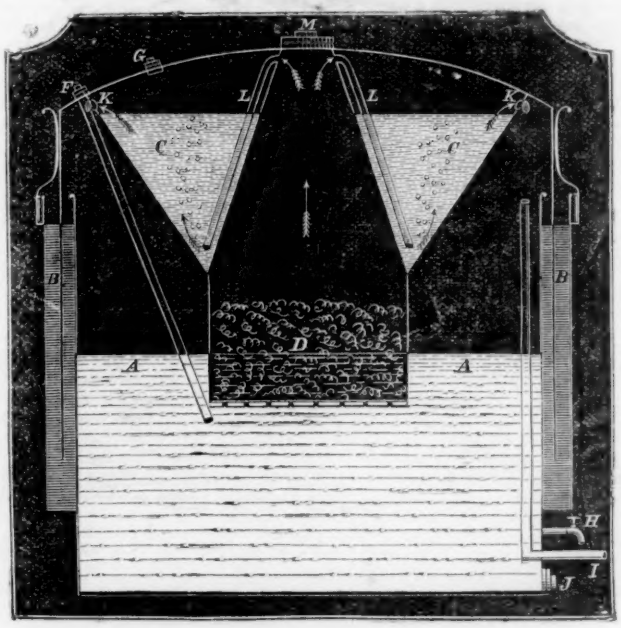
There has been numerous attempts to produce portable machines for making gas for illuminating purposes by using that cheap yet useful hydro-carbon liquid called in the trade gasoleine, which is nothing less than a liquid gas, distilled by nature in her laboratory in the earth, for the use of man.

The process heretofore used with portable apparatus was passing a current of air through a vessel containing this liquid while in a state of volatility, thereby carrying off its vapors to the burners for consumption and light. But many obstacles have intervened to prevent great success in this process, among which is the liability of the vapors to condense in the pipes, choking them, and also collecting in the pendant fixtures from the ceiling, and when the cock is turned on, the pressure in the pipes causing the liquid to spurt out in a fiery fountain, endangering those near by. The tendency of passing oil through a volatile hydro-carbon liquid is to carry off its caloric and reduce its temperature and its volatility, so it has been found in practice, that when many lights were lighted, too rapid volatization of the liquid caused it to reach a point of temperature where it ceased giving off vapor, and so the lights go out. This has been obviated by heating the liquid, but its liability to condense in the pipes still remains. This is explained in the fact that the air has no affinity for the vapor of the liquid in question, therefore does not combine with it, but merely carries the vapor along in a state of mechanical suspension, the constituent parts of air being eighty parts nitrogen and twenty of oxygen. The former will not combine with the vapor of a hydro-carbon, nor with either of its composite parts, hydrogen and carbon, but the oxygen will, if heated.

That the vapor of this fluid will form a combination with some gases is unquestioned; but air is not the medium, unless heated and mixed with the volatile vapor close to the point of combustion, where it will have no chance to condense between the point of mixing and the point of combustion. The heating of the air will cause its oxygen to combine with the carbon and form carbonic oxide gas, which burns like hydrogen and materially improves the flame.

In the cold air process it takes about 60 per cent. of air to carry along 40 per cent. of the vapor of the gasoleine. Now, when air is mixed with this vapor, coal gas, or any other inflamable gas or vapor, in proportions of over 20 per cent. of air, the mixture becomes of an explosive nature, and therefore dangerous. By heating the air at the point of combustion the mixture can be kept under the proportion of 20 per cent. of air, therefore not explosive; for the reason that the gasoleine becomes a gas in warm temperatures, and a very small proportion of hot air will send off a larger proportion of the vapor of the liquid with it.

If hydrogen gas is made the mixing agent instead of air, then the disposition to condense is prevented, as the hydrogen has an affinity for the vapor of this liquid, and its constituent parts, hydrogen and carbon; neither of which will ignite or burn either separate or mixed, out of contact or mixture with the air or oxygen, so that the gas thus obtained cannot be exploded in its pure state, which is the case with coal gas; and its light-giving qualities are of the most brilliant kind, and very small burners can be used, owing to the richness of the gas, whereas in the cold air process very large burners have to be used, and principally argands, owing to the presence of large quantities of air in the mixture.



The accompanying cut represents a sectional view of an apparatus of cylindrical shape, invented and patented by Mr. C. F. Dunderdale, of 90 Wall street, of this city, to effectually carry out the principle of making illuminating gas by a mixture of hydrogen and the vapor of a volatile hydro-carbon liquid, which we consider very ingenious.

The process is to create hydrogen by immersing scraps of iron or zinc into diluted oil of vitriol with water. The chemical reaction caused by this immersion generates hydrogen gas, and at the same time heat, which facilitates the volatilization of the hydrocarbon liquid, and a permanent mixture of the hydrogen with its vapor. The hydrogen is made to pass through the hydro-carbon liquid contained in a separate chamber, directly over the diluted acid, and thereby becomes carburetted, it being necessary to keep the liquid from contact with the diluted acid, as the heat caused by the reaction before mentioned will send off the light hydro-carbon liquid in a state of vapor, faster than in combining proportions, which would cause a precipitation of such excess in the pipes, but this arrangement prevents this, and at the same time secures enough of the heat to complete the combinaion. The machine is arranged with a floating cover to hold the generated gas, and which in rising by the gas collecting, lifts the compartment containing the scraps of metal out of the diluted acid, and thereby stops its generating gas by its automatic action. The weight of the cover also serves as a pressure to force the gas into the pipes. The gas made by this process is of the most brilliant and light-giving character, and is burnt in the ordinary gas jets, but of the smallest size made.

The machines are a little larger than a barrel and of easy management, and when once filled, run by themselves for quite a length of time, without requiring further attention.

In the cut A shows the weight of the mixture of acid and water, B the water between the cylinders, C shows the hydro-carbon liquid in its compartment, D shows the pieces of iron or zinc in the perforated compartment, the arrows show the course of the gas as it rises from the metal scraps, down pipe, L, and up through the hydio-carbon liquid, and through valves, K, into the holder, where it remains until drawn off. F is a pipe for filling in the acid at any time, even when the holder is full of gas; its end being always under water prevents its escape. G is a pipe for supplying the hydro-carbon liquid to the machine, the valves K closing when the cap G is taken off, thereby preventing the escape of the gas from the holder. H is a faucet for drawing off the the mixture of the acid and water. I, the gas outlet pipe to connect with the pipes of the building. J is a trap screw for raking out any sediment that may be deposited in the bottom of the machine. M is a screw cap, through which the scraps of iron and zinc are introduced.

The inventor assures us that the gas made by this process costs less than $1.50 per 1000 cubic feet, and as it is only required to burn two feet per hour of this gas to obtain the same light as that given by burning six feet of ordinary coal gas, the 1000 cubic feet will give as much light for the same length of time as three times that quantity of coal gas, which would be a great saving.

Rights to manufacture and sell under this process can be purchased, by addressing the inventor.

Impure Water.

Few persons are aware of the deleterious effects of impure water, says *Hall's Journal of Health*, or how prone water is to imbibe the impurities of the air. Many think that if the water is clear and cold it must be perfectly pure, though it has stood in a close bedroom for twenty-four hours; but this is far from true. If a pitcher of water is set in a room for only a few hours, it will absorb nearly all the respired and perspired gases in the room, the air of which will have become purer, but the water utterly filthy. The colder the water is, the greater the capacity to contain these gases. At ordinary temperatures a pail of water can contain a great amount of ammonia and carbonic acid gas; and its capacity to absorb these gases is nearly doubled by reducing the water to the temperature of ice. This plainly shows that water kept in a room over night is totally unfit for drinking purposes, and should not be used to gargle in the throat; also that a large pail of water standing in a room would help to purify the atmosphere, but should be thrown away the next morning. It also teaches us the reason that the water from a pump should always be pumped out in the morning before any of it is used.

Chemical Repertory.--No. 10.

JULY 16, 1869.

In resuming my somewhat laborious, though not unpleasant task, of setting forth to the readers of the AMERICAN GAS-LIGHT JOURNAL (after much interruption now for several successive issues, arising from absence and imperative professional engagements) the latest progress of chemical science throughout the world; I am enabled to announce myself in condition to carry out this plan much more to my own satisfaction than before; having succeeded, after long delays, in arranging for prompt and reliable supplies in the future of some of the most important of the foreign scientific journals.

I shall again repeat here that all articles and items in this Journal with which I have any concern, or am in any way properly responsible, will have attached in the future, as heretofore, *my initials*, H. W. This I am especially impelled to do here, because in the issue of June 16th, among other items inserted under this head, without my knowledge, was one lacking in authenticity. I refer to the item "On the Alloys of Iron and Zinc," in which it is stated that "no where is any definite alloy of these metals described." So far from true is this, that the alloys of iron and zinc formed in the baths of melted zinc used for zincing iron, were analyzed by BERTHIER, ELSNER and others, probably half a century ago. BERTHIER found in one 4.3 per cent. of Fe, almost exactly the same as in the alleged new alloy of OUDEMANS (see GMELIN's *Handbuch de Chemie;* ed. of 1844; for very extended information on this subject).

HENRY WURTZ.

13. THE RELATIONS OF LUMINOSITY AND FLAME-TEMPERATURES, UNDER VARYING TENSIONS.

[The Theories of Luminosity, and Calorific Intensities of Flames, are among the most interesting and important topics now before the chemical world, and are undergoing discussion and investigation by the first gas-chemists of the day. Its full share of space will be accorded thereto in these columns, the more especially as the writer has been more or less occupied during a great part of the last half year in association with one of the most eminent of American chemists, in original investigations bearing upon these subjects; investigations which it is proposed soon to resume, and to bring to a state of maturity for publication. Several of FRANKLAND's late articles coming properly under the heading adopted above, have been already inserted by us; but immediately preceding the following article of H. ST. CLAIRE DEVILLE in the same number of the Journal from which I translate it, is a voluminous and brilliant memoir of FRANKLAND, constituting a complete summary, by himself, af all his results and reasonings, which we regret greatly we cannot appropriate bodily. DEVILLE's memoir I have tried to *condense*, but with little success. Though the views he here presents indisputably embody the extreme advancement of our knowledge of the subject, yet there are many obviously unsatisfactory points. These I leave, however, for future discussion.]

"Chemical decompositions, which are almost always accompanied by absorption of heat, appear to me, in a great number of cases, to follow the laws of the ebullition and vaporization of liquids.

"The partial decomposition of a compound gas or vapor by heat, in its own atmosphere, a phenomenon to which I have given the name of dissociation, appears to me to be assimilable in effect to the phenomenon of the vaporization of a liquid in a limited space. The tension of dissociation, like the tension of a vapor, is a function of the temperature. It is true that the tension of a vapor *in vacuo* appears sensibly equal to its tension in air or other gas; in other words, that the amount of a liquid which evaporates in a closed space depends only upon the dimensions of this space, and not in any way upon the amount of any supposed inert gas that may exist at the surface of this liquid; whilst it has not been demonstrated that at a given temperature the tension of dissociation, of watery vapor for example, is the same in its own atmosphere and in a mixture thereof with nitrogen. This difference, which I have already suggested, (and which M. VICAIRE, in an excellent article on the subject, has put into a precise form) if it really exists, may not be as general or as capital as has been conceived. In any case, the necessity may be asserted of a more rigorous demonstration than hitherto of the laws governing mixtures of gases and vapors. But, putting aside for the present this point of detail, the analogy between the phenomena of dissociation and vaporization remains nevertheless very close.

"To continue the comparison then beyond the limits established by experiment, it is evident that the point of decomposition of a volatile body should rise with the temperature (pressure?), like the boiling point of a liquid."

M. DEVILLE then quotes from a recent article of his own in the *Comptes Rendus*, written with these views in his mind; as follows:

"FRANKLAND shows that the more the pressure is increased upon the jet of an oxyhydrogen blowpipe burning in compressed air, the more *brilliant* and *luminous* it becomes."

[DEVILLE points out the highly useful distinction, usually neglected, between *brilliant* and *luminous* flames, restricting the latter to flames which emit light approaching that of the sun, 'white light'; whereas a *monochromatic* flame may be highly brilliant, while not at all luminous, in this sense.]

"At a high pressure the oxhydrogen flame becomes as luminous as a candle. Such results are as unforseen as they are neatly and clearly established. FRANKLAND seeks for better explanation of this grand fact, and finds it solely in the increase of density. He impugns the classic views of Sir HUMPHREY DAVY, whose theory of flame has always seemed to rest upon an impregnable basis. Here I dissent from him; founding my opinion upon certain facts not yet fully analyzed, but which I shall soon describe, when brought to that form of demonstration demanded by science." [The point in FRANKLAND's views he dissents from is that where F. claims to have shown that the luminosity of hydrocarbon flames may not be, and is not, due to incandescent impalpable carbon.] "I will not so decidedly attack the views relative to the influence of *density* on illuminating power; but shall rather develop here an idea of which I find the germ in FRANKLAND's communication. He explains the lack of illuminant power of the flame of phosphorus in chlorine, on the ground of the slight elevation of temperature accompanying this combustion. I believe this to be the true and only reason.

"Let us first consider what is the principal condition that a flame must fulfil, in order to be luminous. If we take a hot and dark flame, like that of a Bunsen burner, and introduce common salt, every body knows that a light is obtained of little intensity and monochromatic, the prism developing in its spectrum but one brilliant ray. But if we increase the temperature of this flame, by transmitting oxygen for example, the light instantly brightens, the number of rays multiplying, and approaching to the complete spectrum. The experiments of FIZEAU and of WOLF and DIACON, in this direction, are of remarkable neatness; but if we employ DEBRAY's apparatus, which admits of spectroscopic observations at the extremely elevated temperature of 2500° C. (4532° F.), the sodium spectrum develops and completes itself. We may admit that then the great number of brilliant rays contained in the developed spectrum so confound themselves together as to form a whole which *seems continuous*. A similar observation is made when we burn large masses of sodium in air or oxygen, or when lithium is burned; the Na flame, ordinarily yellow and nonchromatic, and the Li flame, ordinarily red, both then become *white*. They contain then all the rays, or, if you like, brilliant rays of all refrangibilities. That is, metals become *luminous* when they burn at very high temperatures.

"This observation is still more exact for the invisible rays, for the *chemical* emanations, which crowd and multiply themselves in proportion to the temperature, a capital observation, due to MASCART. The confusion of the rays, by reason of their multiplication, so as to form an apparently continuous spectrum, is a fact similar to that of FRANKLAND's experiment. In proportion to the pressure, the number and intensity of the rays in the hydrogen flame of the compound blowpipe increase. What more rational conclusion than that the temperature increases with the pressure. This is a capital fact, the demonstration of which may appear already sufficient, but which is full of such important consequences that direct verifications are still demanded. I return again to the processes of verification I propose to employ, bnt desire at once to show that these considerations, drawn from spectral analysis, explain very well the fact of the considerable illuminant power of arsenietted hydrogen, a power which DAVY's theory (incomplete, as I believe, in this point of view) cannot interpret by the supposed presence of a solid body in the flame. It is evident that *gas*, in burning, evolves rays. If these rays are brilliant and numerous, by reason of the inherent nature of the substances involved, it is clear that the flame of this gas will be brilliant and luminous in proportion as the spectrum contains a greater number of rays of varying refrangibilities. In this special casewe have a phenomenon peculiar to arsenic vapor contained in an arsenietted hydrogen flame, and it seems to me useless for the explanation of such a fact to bring in the consideration of densities, which is compromised moreover by FRANKLAND's own objection, drawn from the flame of phosphorus in chlorine.

"Thus the i luminating power of an entirely gaseous flame is a specific property dependent upon the production of rays furnished by the materials that it contains. It is as inexplicable as other specific properties, as density, color, etc. Moreover the ideas of FRANKLAND relative to the production in ordinary flames of very dense hydrocarbons seems to me difficult to sustain by experience. It is, in fact, known that all hydrocarbons at low temperatures tend to separate into hydrogen and carbon; the latter hydrogenated, it is true, but *opaque*. I believe that the theory of DAVY remains then intact."

[He of course refers in this last sentence to hydrocarbons only, as he has just before shown the inapplicability of DAVY's view to other luminiferous gases, such as arsenietted hydrogen. In a note he refers to previous experiments of his own (*Revue des Cours Scientifiques*, December 10, 1864, p. 22,) to the effect that "in carbonic oxide when strongly heated, there is a dissociation of the gas with the production of oxygen and *yellow carbon*, light and pulverulent, to which is due, to all appearance, the blue tint of the flame." The last supposition is uot qery intelligible. It is possibly to investigations in this direction that he refers above in dissenting from FRANKLAND's rejection of DAVY's theory on the ground of "facts not yet fully analyzed."]

(To be continued.)

---

14. "HYDROGENIUM"

FAVRE believes that he has found new evidence of the really metallic nature of hydrogen, in its compound with palladium. He proposed to ascertain the amount of *heat-development* during the combination. He placed in a normal dilute sulphuric acid two like pairs of plates, one of zinc and platinum, the other of zinc and palladium. The first pair set free its hydrogen, which was measured. To the other pair a rheostat was attached, so to retard the action that the hydrogen was wholly absorbed by the palladium, which thus took up finally 800 times its volume. A calorimeter being employed the heat developed by the two pairs respectively, was

For the zinc and platinum.....19,835	equivalents or "*calories*."
For the zinc and palladium.....23,988	"
Difference..... 4,154	"

the latter being the heat developed by the gaseous hydrogen in alloying with the palladium. All this is exceedingly interesting, though *inevitable*. FAVRE's supposed new evidence consists in this: that he repeated the calorimetric observation seventeen times with the same plate of palladium, and during the last experiment the development of heat from absorption of the same weight of hydrogen was about the same as in the first; whereas, according to previous experiments of his on the absorption of carbonic acid by charcoal (*Comptes Rendus*, 39,731,) the absorption of successive equal weights of this latter gas yielded constantly diminishing amounts of heat, in consequence of its diminishing condensation in the pores of the charcoal (*Comptes Rendus, June* 7, 1869, page 1,306).

[FAVRE's new evidence does not seem beyond demur. The analogy with charcoal would be more satisfactory were the latter homogeneous, like palladium, and free from visible pores. Though the possibility, even the probability, of a *metalloid* form of hydrogen (as there is one of carbon) is undeniable, yet this ancient theory of the metallic nature of hydrogen appears to me, not withstanding GRAHAM's brilliant discoveries, to rest as yet rather upon poetical than inductive ground. At least it may be distinctly asserted that there is nearly as much evidence that both oxygen and nitrogen are also metals. Fused silver absorbs oxygen, without change of metallic characters, and the "ammonium-amalgam" contains nitrogen as well as hydrogen. Many of the metallic oxides are metalloid in aspect, magnetic, electric conductors etc.; and nitrogen forms metalloid nitrurets. The elements of the nitrogen group are metallic, except phosphorus, which is asserted to have been obtained also in a metalloid form.

It is asserted by GRAHAM that hydrogen is not eliminated from the palladium compound *in vacuo*. This, if *strictly* true, appears to separate the phenomenon far more decisively and conclusively than FAVRE's new facts, from the category of phenomena of mere absorption and liquefaction of gases by porous bodies; but there are nevertheless other facts which widely distinguish the new compound from alloys, at least of *solid* metals, such as hydrogenium is believed by its author to be. Indeed, an inductive view of all the facts seems to tend towards the conclusion that, both in this and in the corresponding carbonic oxide compound, the palladium is in a state analogous to that of gold or silver penetrated by liquid quicksilver, pointing to a liquid condition of the cendensed gas. FAVRE himself, in the course of the article above quoted, lays stress upon the rapid penetrability of the solid Pd by the H, so that notwithstanding the first action can be but superficial, "the hydrogen penetrates and saturates very rapidly the deepest layers of the metal, through the mass of which it travels by *cementation*." I would ask also what case is known of an alloy of solid metals formed by voltaic precipitation of one on the other. Amalgams, however, are readily thus formed, even of metals hard to amalgamate otherwise. Above all I would ask, is it conceivable that any alloy of solid metals once formed, could ever be *decomposed* throughout its mass, like the palladium compound, by being made the positive electrode in an electrolyte? It is, however, not at all inconceivable that an amalgam might thus behave. Against this may be argued the general destruction of tenacity by Hg; but this is far from invariable, as several metals (among them lead) can be combined with considerable Hg without destruction of malleability or tenacity.

I have hinted above at the possibility of a special metalloid form of hydrogen. In fact GRAHAM concludes that the hydrogen in the Pd compound is in the *active* form, corresponding to active oxygen (ozone. *Is ozone then metalloid?*) Does it not follow that if this active hydrogen is metallic, ordinary hydrogen is not so? Finally, I would inquire whether it has heretofore been taken into this consideration, what we are to make of the combinations of *carbonic ozide* with palladium and iron. Are we to create another hypotnetical *compound* metal, *carbonylium*, and is steel possibly an alloy of carbonylium? Further speculation in this direction, however, we shall for the present hand over to the next lunatic asylum, and wait until some master-hand, by crucial experiment shall rend the vail, and let light into the labyrinth in which we now so blindly grope.]

H. W.

CHEMICAL *EXCERPTA*.

Chemical Analysis of the Solar Atmosphere.—RAYET announces that he has been for some time aware of the existence of a new bright spectral line from the above source, which has not been before pointed out. It is between G and H of FRAUNHOFER, and is the fourth of the principal brilliant rays of hydrogen, three of which have already been recognized in the "chromosphere." It is often bulbous, or globular in appearance, like F. This makes six bright rays now known from the chromosphere, and it is remarkable that four of these belong to hydrogen. Nevertheless this atmosphere is not, as LOCKYER and others have supposed, composed exclusively of hydrogen. SECCHI has observed the third ray of magnesium, and the yellow line near D is not believed to be a ray of hydrogen. RAYET himself in an article published in the *Comptes Rendus* of the 8th of last February, discussed this yellow ray.

The observations made during the eclipse of the 18th of August last, have shown moreover, that the protuberances or elevated masses of the chromosphere do not always have the same chemical composition.—*Comptes Rendus*, June 7, 1869, p. 1321.—H. W.

On the Limits of Hydrogenation of Hydrocarbons; by BERTHELOT.—It is a fact, beyond which experience has not yet advanced, that *formene* C^2H^4 (marsh gas) represents this limit. But this carburet saturated with hydrogen, cannot be further associated with a second molecule of another saturated body, such as formene itself, without the loss of an equal volume of hydrogen H^2:

$$C^2H^4 + C^2H^4 - H^2 = C^4H^6 .$$

The carburet C^4H^6 represents then, in its turn, the limit of hydrogenation of carburets containing 4 equivalents of C. Like formene it is saturated, and *because* the formene is already saturated. It follows that C^4H^6 cannot unite with a third molecule of formene without a new elimination of an equal volume of H, forming a new saturated hydrocarbon,

$$C^4H^6 + C^2H^4 - H^2 = C^6H^8 ,$$

and so on: the generic formula of saturated hydrocarbons of the formene series being $C^{2n}H^{2n+2}$. On the other hand the series $C^{2n}H^{2n}$ can in general fix, by direct addition, their own volume, H^2. BERTHELOT expresses this thus $C^{2n}H^{2n}(—)$. The series $C^{2n}H^{2n-2}$ can fix either H^2 or $2H^2$, which he expresses by

$$C^{2n}H^{2n-2}(—)\,(—).$$

Generally, a compound $C^{2n}H^{2(n-p)}$, whatever its origin or mode of generation, can fix H^{2p+2} or an equivalent volume of any other body either simple or compound. BERTHELOT has proved, by his new method of hydrogenation of organic compounds by the action of *hydriodic acid*, that these principles have not merely the limited application which has hitherto been granted to them, but that they apply to all cases *without reserve*.—(*Bulletin de la Soc. Chimique, Mai*, 1869, page 359).—H. W.

Metamorphoses of Toluidine and Pseudotoluidine.—In No. 5 of our REPERTORY, January 2, 1869, we have given a quite full account of ROSENSTIEHL's very remarkable discovery that ordinary *toluidine* is a mixture of two isomeric alkaloids. BERTHELOT, in following up this discovery by the help of his new methods of hydrogenation, has arrived at highly interesting and instructive results. He wished to know whether the commercial toluole, from which the two alkaloids were derived, was or was not itself a mixture of two corresponding isomeric hydrocarbons. Pure pseudotoluidine, obtained from ROSENSTIEHL, was treated with HI, after his usual plan; and toluidine operated on in the same way. The products from both, with excess of HI, were *hydruret of heptylene* and *ammonia*:

$$C^{14}H^9N + 5H^2 = C^{14}H^{16} + NH^3 .$$

This reaction at once distinguishes these alkaloids from their isomere *methylaniline*, which gives hydruret of hexylene $C^{12}H^{14}$ and marsh gas, with ammonia With toluidine and much less HI, toluole is reproduced

$$C^{14}H^9N + H^2 = C^{14}H^8 + NH^3 .$$

This toluole is altogether free from benzole, and has all its ordinary properties. The alkaloid obtained from it, however, was *a mixtnre of toluidine and pseudotoluidine*, just like that from ordinary toluole of coal tar. This BERTHELOT readily proved by means of the elegant colorific reactions of ROSENSTIEHL. Pseudotoluidine, under these latter conditions, also reproduced toluole, but with a little benzole and a complementary hydrocarbon having a high boiling point. This toluole, when purified, gave also a mixture of toluidine and pseudotoluidine. Toluole, after transmission through a red hot tube, and subsequent purification, gave also the two isomeric alkaloids, mixed. It is the same with toluole obtained by heating xylole to redness, and with toluole from balsam of tolu, and from several other sources tried. The question is then decided in the negative. We cannot take room to follow BERTHELOT at length in his instructive inferences from these facts, but must refer to the original. We shall merely say briefly that he starts with his synthetical discovery that a molecule of benzole contains three molecules of acetylene, benzole being *triacetylene*:

$$C^{12}H^6 = C^4H^2 + C^4H^2 + C^4H^2 ;$$

and that toluole is derived from benzole thus (see the last item, on "*the limits of hydrogenation*"):

$$C^{12}H^6 + C^2H^4 = H^2 = C^{14}H^8 .$$

The three molecules of acetylene "play a different part" in the molecule of benzole, and "the toluidine isomerism is therefore a consequence of the complex constitution of benzole."—*Bulletin Soc. Chimique*, May, 1869, p. 381.—H. W.

[ROSENSTIEHL *on the same question*.—Immediately following the above article of BERTHELOT, in the same number of the *Bulletin*, is a voluminous memoir by ROSENSTIEHL himself, in discussion of the same problem, to all appearance entirely independent of BERTHELOT's investigation. ROSENSTIEHL attacks the subject according to the same general plan, of regenerating the toluole from the two isomeres, and converting it back again into the two alkaloids; but his modes of effecting the metamorphoses are entirely distinct from those of BERTHELOT. We can only cite his conclusion, "*il n'y a qu'un seul toluene*"—there is but one individual toluole. On further examination I find that abstracts of both these important papers were first presented to the French Academy on March 8th, and appear in the *Comptes Rendus* of that date. ROSENSTIEHL's theoretical view of the isomerism, as presented in the abstract, is of interest. Benzole being triacetylene, as above, he makes toluole to be

$$C^4H^2 + C^4H^2 + C^4H\,(C^2H^3),$$

methyle being substituted for H in one of the acetylene molecules. One of the two toluidines, he says, would then be either

$$C^4H\,(NH^2) + C^4H\,(C^2H^3), + C^4H^2 \text{ or}$$
$$C^4H^2 + C^4H\,(NH^2) + C^4H\,(C^2H^3),$$

which both amount to the same thing; and the other

$$C^4H^2 + C^4H^2 + C^4\,(NH^2)\,(C^2H^3).$$

H. W.

Proposed New Pigments.—Everybody has by this time heard of SACC's proposed new white pigment *tungstate of baryta*, which is claimed to cover as well as white lead, while it is innocuous and unalterable by the air. SACC has now patented in France (*Brevet No.* 83,721) a number of new colors, founded upon the same idea. *Stannous* tungstate is indigo blue; *ferric* tungstate chamois; *cobaltous* tungstate violet, and blue when calcined; *chromic* tungstate deep green, and *nickelous* tungstate bright green. SACC claims that these colors are all very stable and present a remarkable lustre.

[The present writer, eighteen years since, prepared in the laboratory of WOLCOTT GIBBS, then at the New York Free Academy, a permanent *yellow* or *orange* pigment, which was pronounced by skilled artists to whom it was submitted at the time, to have a finer color and a greater body than cadmiun yellow. This compound was a *uranate of baryta*. The compound itself was not new, but the mode of preparation was novel, and will serve as a general method of preparing insoluble uranates. It was by boiling carbonate of baryta in a small excess of a solution of the nitrate of uranic oxide. The product is lemon-yellow and has a fair body, but acquires its brilliant orange tint and high body by applying an extremely careful and gentle heat to it in a porcelain crucible, stirring with a glass rod. A trace of organic matter will turn it greenish at this stage, by reduction, and ruin it.—H. W.]

A new crystalline form of Silica.—DE RATH has found in a volcanic porphyry from Cerro San Cristobal, Mexico, a mineral he calls *tridymite*, which is pure silica of the density of what has heretofore been regarded as "amorphous" silica, 2.3; the density of ordinary quartz

being 2.6. Tridymite, like quartz itself, is hexagonal, but occurs in very beautiful macles. It is uniaxial.—*Bulletin Soc. Chimique*, June 1869, p. 482; from *Poggendorff's Annalen.*

[This is a new fact looking to the probable banishment from chemical language of the term amorphous, at least with the sense usually attached to it. The tendency is towards the identification of the condition of solidity with the action of crystallizing forces, that is, of *polarized* equilibria of attractive and repulsive tensions. Even the colloid and viscoid consistences or conditions appear to be but transition or medium states between liquidity and solidity.—H. W.]

Solubility of Indigo in Chloroform.—Stockvis announces this as a new fact, stating that the solvent takes up the color largely and readily.—*Bulletin Soc. Chimique*, June 1869, p. 513; from Dingler's *Polyt. Journal.*

Composition of Oil of Sassafras.—Grimaux and Ruotte have examined the oil of (the root?) of *Laurus sassafras.* Density at 0°C. 1.0815; turns the plane of polarization to the right 3°5 for a length of 100 mm. Is a mixture of a dextrogyrate hydrocarbon and an inactive oxygenated principle, also very little of a body of the phenol series, which enables it to reduce nitrate of silver on ebullition. Potash separates this. An analysis is given, but no formula deduced. The name for this phenol would provisionally be *safrol.* The hydrocarbon *safrole* ("safréne" of the authors) is $C^{20}H^{8}$, another isomere therefore of oil of turpentine. It boils at 156° C. is dextrogyrate, rotating the beam 17°5 for 100 mm.; density 0.8345. To the oxygenated principle, the authors give the name "safrol," which probably belongs, as above, to the phenol. It is $C^{10}H^{10}O^{2}$, boils at 232°C., is neutral to polarized light, constitutes nine-tenths of the essence, has the odor of sassafras, resiuifies in the air, is insoluble in water (!), density 1.1141; it remains liquid at —20° C. This is therefore the essential constituent of oil of sassafras. The name *sassafrole* would seem appropriate. If an aldehyde, it would of course be safral or sassafral. Saint Evre, who previously studied oil of sassafras, had a *solid* oil (resinified?), for which he found the composition $C^{10}H^{14}O^{2}$.—*Bulletin Soc. Chimique*, June 1869, p. 462.—H. W.

Oxidation of Aniline.—Follens and Fischman inform the French Chemical Society that the action of chloride of lime on aniline is impeded in presence of ammonia and ammoniacal salts, a great excess of chloride being then necessary. This is important to know in the preparation of aniline colors.—*Bdll. Soc. Chimique*, June, 1869, p. 442.—H. W.

Artificial Manufacture of Alizarine.—We have already noted the remarkable discovery of Graebe and Lieberman, of the conversion of *anthracene* (paranaphthaline), a hitherto worthless, though large, constituent of gas-tar, into the beautiful color alizarine, heretofore only obtained from madder. These chemists have now patented their methods in France (*Brevet No.* 83,557) and probably elsewhere. Their process consists of three operations:

1. The transformation of anthracene $C^{14}H^{8}$, into oxanthracene or anthraquinone $C^{14}H^{10}$, by the action of bichromate of potash and an acid, or of a mixture of nitric and acetic acids.

2. Brominated anthraquinone is then formed, by the action of bromine, which by the action of alcoholic potash becomes $C^{14}H^{6}Br^{4}$, and this, oxidated by nitric acid or bichromate, becomes $C^{14}H^{6}Br^{2}O^{2}$, which is recrystallized pure. Chlorine may be used instead of bromine.

3. $C^{14}H^{6}Br^{2}O^{2}$, when heated with very concentrated potash, to from 180° to 260° C. (356° to 500° F.) becomes blue, and when the intensity of the color no longer deepens, the alkaline alizarate is decomposed by an acid, and pure alizarine separates.—H. W.

A New (!?) Thermo-electric Battrry.—Mure and Clamond have brought before the French Academy, as new, a form of thermo-electric apparatus, which seems to be an attempt to commit "flat burglary," upon our countryman Farmer of Boston (who had his apparatus at the French Exposition). It is pleasing to find that Edmond Becquerel at once perceived and pointed this out, on the occasion. The authors use, as their elements, *iron* and *galena.* Becquerel showed also that galena was used as long ago as 1823, by Cumming. He objects to the use of sulphurets altogether, on account of the obvious danger of such elevation of the heat as to alter their constitution, preferring unalterable metals and alloys. For his other somewhat extended remarks the original must be referred to; but his concluding paragraph has sufficient interest in this connection to demand space:

"The results obtained with this battery, which is interesting to science and of facile use, prove that thermo-electric batteries are not yet as economical as has been supposed. It is true that the heat produced by the (gas) burner may be better utilized by the plan of putting a greater number of elements around the chimney (radially, as in Farmer's plan) but even then, as in all such apparatus, the portion of the heat which is utilized in the production of thermo-electric current is but a very small fraction of that which is communicated to the elements, the rest being lost by radiation, etc."—*Comptes Rendus, Mai* 31, 1869, pp. 1255–56.

H. W.

Recognition of a faint light in the presence of a brilliant one.—Taking the hint from the late wonderful results of solar spectroscopic analysts, Seguin has proposed the use generally of the spectroscope for the above purpose, and has demonstrated it by certain observations on the voltaic arc, for the details of which I must refer to the original (*Comptes Rendus*, June 7th, 1869, p. 1322). This is a very pregnant suggestion.

H. W.

Action of Bromine on Acetylene—Gas Analysis.—Berthelot has heretofore found irregularities in this action, there being at times no action. Hence it has been supposed there might be *two* isomeric acetylenes. Recently, however, operating on a foggy day, while the fog was dispersing, he has discovered that light plays an essential part in the formation of bromide of acetylene. But, still, other conditions are requisite. Sometimes, in strong diffused light, no action is observed for some minutes, and then the reaction suddenly takes place.

This circumstance influences the analysis of gaseous mixtures containing acetylene. When it is mixed with only hydrogen, marsh gas, and any other gas not absorbed by cuprous chloride, ammoniacal cuprous chloride may be applied at once, the ammonia and watery vapor being afterwards removed, of course, by oil of vitriol. But if carbonic oxide be present, this will be absorbed with the acetylene. Bromine may then be resorted to, but it is necessary to ascertain by the qualitative use of the ammoniacal cuprous chloride when the absorption has been completed. If it be found that bromine has little or no action, it is then indispensable to resort to a surer reagent, monohydrated sulphuric acid, which he has found to absorb acetylene with proper agitation, completely, but it must not be forgotten that this agitation must continue from a half to three quarters of an hour to ensure complete action. The ammoniacal cuprous chloride will now be found to show an entire absence of acetylene,—*Bulletin Soc. Chimique, Mai*, 1869, p. 372

[It was pointed out, many years ago, by our lamented friend, Dr. Ellet (one of the most skilful gas analysts of his day, and probably the only thorough chemist in this branch we have had in this country heretofore) that *acid* cuprous chloride absorbs, with carbonic oxide, *all* the illuminant hydrocarbons of coal gas. Acetylene was then scarcely known. We hope soon to spare room to exhume Dr. Ellet's methods of gas analysis, which were far in advance of his time, and were in part entombed in an old number of the *London Gas-Light Journal.* We should like to know, and shall take an early opportunity to determine, the action of *ammoniacal* cuprous chloride on the illuminant gases and vapors generally.]—H. W.

Upon the Direct Oxidation of Hydrocarbons.—Berthelot has made the extremely interesting discovery that various hydrocarbons may be oxidated immediately, and without loss of carbon, with the production of neutral bodies, such as aldehydes and their congeners. He operated with crystalized chromic acid, dissolved in a small quantity of water. Pure *ethylene* (freed from vapor of ether, by repeated washings with concentrated sulphuric acid) is attacked slowly at 120° C. (448° F.) with formation of aldehyde

$$C^{4}H^{4} + O^{2} = C^{4}H^{4}O_{2}$$

In the cold, or even at 100° C, after many hours, no appreciable reaction was found. The aldehyde was separated by distillation and crystalized aldehyde-ammonia prepared from it.

Pure *propylene* was oxidated much more readily and almost at the ordinary temperature, in a few hours a great quantity of *acetone* being formed:

$$C_{6}H_{6} + O_{2} = C_{6}H_{6}O_{2}.$$

This acetone is easily isolated by simple distillation. Some acetic acid appears, being a secondary product from the acetone. *Amylene* is attacked violently, at the ordinary temperature, with formation of complex products, derived however doubtless as secondary products of oxidation of an acetone, $C^{10}H^{10}O^{2}$, which may be obtained by moderating the reaction. *Acetylene* is oxidated in the cold; with heat, and production of formic and carbonic acids.

Crystallized *camphene* is changed easily into *camphor* by pure CrO^{3}, on heating gently:

$$C^{20}H^{16} + O^{2} = C^{20}H^{16}O^{2},$$

the reaction being easier than that with platinum-black, long since discovered by Berthelot.

In conclusion, he remarks that the oxidating action of pure CrO^{3} is not exactly equivalent to that of mixed bichromate of potash and sulphuric acid; in the latter the presence of the sulphuric acid, as well as the heat evolved in the formation of the chromic and potassic sulphates, modifying the action (*Bulletin Soc. Chimique, Mai*, 1869, p. 374).

[The name *camphene* is given by Berthelot and some other French chemists to the solid hydrocarbon, isomeric with oil of turpentine itself, which is separated by alkalies from the crystalline compound that turpentine forms with muriatic acid. The properties of the camphor thus artificially made by this new method should be examined, as it might turn out to be commercially important.—H. W.]

The Utilisation of Small Coal.

Of late years the question of utilising the vast accumulations both under and above ground of small coal has engaged the earnest attention of colliery proprietors, and the many plans and inventions propounded for solving the problem have received a large amount of attention from those interested in the coal trade. In every colliery district in the kingdom, more especially the older ones, the quantity of small coal on the surface, lying not only useless, but in many cases a positive obstruction, which is desirable to remove, is something enormous, and probably quite as large a quantity has been left under-ground as worthless rubbish.

Some coal cannot be worked without making a large percentage of small, and where that is the case the colliery proprietor suffers a serious drawback from his profits, in consequence of the difficulty experienced in obtaining a market for his small coal; and if a market is found, the price is ridiculously low. Of the inventions proposed for utilising the small none seem to have been established as a success excepting Baker's process, which, after many vicissitudes, is now declared to have completely accomplished the object in view. This process was first tried in the neighborhood of London, afterwards at Aberaman, and other places, and the patent right was finally purchased by the Compressed Coal Company, a private concern, comprising several wealthy Gloucestershire capitalists. They established works at Whitecroft, in the Forest of Dean, and for some time past have been incurring a large expenditure in bringing the process to that state of perfection which enables them to pronounce its commercial success.

From the first introduction of the patent no doubt was entertained but that it developed the right principles; but difficulties arose in carrying out the details, more particularly in reference to the machinery. The Uskside Company, of Newport, Monmouthshire, were entrusted with the manufacture of the machines, and, although at the commencement only partial success was atttained, experience enabled the engineers to overcome the difficulties that presented themselves, and to turn out a machine which is in every respect a success gives unqualified satisfaction, produces blocks of any size, and eliminates everything that is objectional in the fuel. What is particularly gratifying, too, is the fact that the fuel sells at a handsome profit, and the demand is at present far in excess of the supply; The Compressed Coal Company must be congratulated on the success of their patient and well merited efforts, for had not the inventive genius of the patentee been supplimented by their capital and perseverance, and by the skilled and experience of the manufacturers of the machine, it is not improbable that, like many other valuable inventions, it would have been allowed to drop into obscurity until its value was more generally appreciated.

It may be added that the process is likely to be extensively adopted at the coaling stations, both at home and abroad, where a large amount of small is made, which, instead of being a loss to consumers, as is now the case, will then be turned into profitable account.

A Gloucestershire paper, in its report of a meeting of the Forest of Dean mining proprietors, held at the Severn Bank Hotel, Newnhan, makes the following reference to the fuel:

"We noticed one fact of great public interest at the hotel on Tuesday. At either end of the room in which the meeting was held there was burning a brilliant fire, making little or no ash, and fed by what appeared to be square bricks of coal. We learnt that this was the first public trial of a commodity supplied by the Compressed Coal Company, which has lately established its works at Whitecroft, Lydney. The waste coal, that heretofore has been sold by thousands of tons at 1s. per ton, is now by a patent process compressed into small blocks. These last longer than the ordinary lumps. They are excessively clean in the using, and 1½ ton of them may be packed into a space which would suffice for only 1 ton of the large coal. We hear, and can believe, that the company is likely to drive an extensive trade."

The fuel is well suited for steam-boilers, as well as for domestic use.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—EDS.]

Explosion of the Meter at the Cincinnati Gas Works.

MADISON, INDIANA, June 15, 1869.

Messrs. Editors: In your issue of June 2nd I noticed an article under the above caption. Anxious to learn all the particulars of the accident, I read the article referred to very carefully, as I have all the articles on the subject that has appeared in the Cincinnati papers. The article in your Journal, I must confess, somewhat puzzled me; it seems like the Dutchman's law suit with his neighbor for killing his dog, his own statement defeating him, to wit, the value of the dog was proven to be nothing, the neighbor was proven innocent, and the Dutchman proved not to be the owner of the dog killed, or any other one.

So it seems in this case. Your correspondent says in the beginning, that the meter exploded; in the 7th line he says the gasometer exploded; he then states the capacity of tue holder to be 500,000 cubic feet, and the cause of explosion unknown; also, there was at the time of the accident no fire in the cauldron (what is that), and no gas had been let into the holder for six hours: he then gives some theories on the subject, such as solar heat, atmospheric air, etc., etc.

In your comments upon it you say, it is possible that the exhauster by some means forced air into the holder, and when at the moment the precise quantity had been admitted, some careless smoker may have set fire to it by means of a match used in lighting his pipe, or the holder may have been tilted or lifted above the water seal in the tank, the gas escaping from the holder while tilted, was set fire to in the space between the holder and the tank wall, and that caused the explosion. To persons at a distance, or those unacquainted with the construction of gas works, or the nature of gas, these things may seem very plausible indeed, while to others it is all bosh. Mr. Editor, it is well to suggest something that would be likely to cause the explosion so much talked of among the gas fraternity, and read of in almost every newspaper in the land, as the great explosion at the Cincinnati gas works. The truth is, Mr. Editor, the most of those who have written on the subject, know but little or nothing of what they write. The article in your Journal has some truth in it, and many errors, not intentional; for I would not charge your correspondent with such a thing, but for want of correct information on the subject. The meter, your correspondent says exploded, was not injured; the gas holder, No. 5 at the new house, as it is called, was completely ruined; its capacity being, as you say, 500,000 cubic feet, its size you say 150 feet diameter and 42 feet deep: at the time of the accident it contained about 370,000 cubic feet of gas, or in other words, was three fourth full, consequently it must have been 30 feet out of the water and 10 feet in it, giving a water seal of 10 feet; it had 12 guide columns to support it—they are yet standing; the annular space was about 18 inches.

With the facts and figures before you, what becomes of your theories. Solar heat, in a very warm day, might probably have expanded the gas, and raised the holder two or three feet, not more, leaving a seven feet seal at the bottom; impossible for gas to blow out at that seal; the day was not a warm one, on the contrary, it was quite cool and pleasant. Away then with your solar heat theory. The holder having seven to ten feet dip in the water, and so little space between it and the tank wall, could not have tilted over enough to let gas escape at the bottom, fill the space, be set fire to, and thus cause an explosion, even if there had been no guide columns to support it—then your tilting theory is gone. The admission of atmospheric air theory—at 6 A. M. the holder is said to have contained 370,000 feet of gas, the inner valve was shut, and no more gas was let into it. Would it then contain enough air to make the contents explosive? I think not, as it requires 16 air to one part gas. If the holder could not contain it, how could it be exploded by that means? It was impossible; but admit it true that it would, how could you get fire to the contents through a 10 feet seal? Again, admit that you could do so, with nothing to hold it at the top, it would have shot upward like a rocket—as it was it never left the tank. This theory will not do either; then you must find something else As with the Dutchman, so with your correspondent; he has got on the wrong track, and to prove the assertion, I do insist that the meter did not explode, it was the gasholder that did the mischief. The gasholder did not explode, it was something else; finally, there was either a meter or gasholder exploded at the Cincinnati gas works.

Had the holder become charged with atmospheric air, as you suggest, and exploded, what would have become of the city itself; it would be numbered among the things that were. Do you suppose that only one man would have been killed, and only six or eight injured, and no buildings destroyed? I tell you nay—but like the cities narrated in the good book, there would not have been a stone in it that would not have been overturned. Imagine the destruction 379,000 feet of powder would cause if exploded, at the place this accident happened. When gas and air are properly mixed it is equally destructive. I again assert, without fear of successful contradiction, that there never was an explosion of either meter or gasholder at the Cincinnati Gas Works, but on the contrary, it was a

COLLAPSE.

The Gas Explosion at Cincinnati.

LOUISVILLE, KY., June 8, 1869.

Messrs. Editors: Contrary to expectation we have very little concerning the gas explosion at Cincinnati, Ohio, in the last number of your Journal. Possibly your time of publication occurred too soon after the accident, to give time for collecting reliable information on the subject. Such I trust is the case, and that in the next number we shall have a satisfactory explanation of what at first appeared inexplicable.

The circumstances under which it occurred appear to be about as follows: The gasholder was full of gas (and I think the valves were closed), workmen were engaged scraping and re-coating it with coal tar, the siding or perpendicular portion having already received its coating of tar, the crown was being scraped over preparatory to the same treatment, and is said to have been leaking very badly, and the day was warm. My conclusion is, that the escaping gas, and the hydrocarbon vapors from the freshly tarred sides of the holder were sufficient to form, when mingled with the air, an explosive mixture over the top of the gasholder, where, I am satisfied, the explosion occurred.

Mr. Thomas, the engineer of the works says: "I was sitting at one of the windows of my office, which is directly opposite the destroyed gasholder; my attention being called by the loud report, my eyes were immediately turned in the direction of the sound; I saw the gasholder split across the crown, the gap gradually widening until the opening must have been ten feet in width; I saw the fire descend into it and iguite the gas, and in an instant the whole body of the gas was in flames; I think in less than three minutes, from the time of the explosion, the gas had all been consumed, and the gasholder settled rapidly to the bottom of the tank."

This, I think, is sufficient to prove that the explosion was not in the gasholder, nor at the bottom in the annular space between the tank wall and side of the gasholder, as suggested by you; everything appears to have fallen inwards rather than outwards, even to portions of the guide frame at the top of the columns, which could not have been the case had there been an explosion below. I think the most reasonable way to account for it is, that an explosion over the gasholder, as suggested above, causing a downward rush of the atmosphere, thus pressing the holder down, thereby compressing the gas contained in it (the valves being closed); the explosion over, there existed a partial vacuum above, the top was instantly relieved from external pressure; the internal pressure remained the same, and could only be relieved by the ga-holder raising, which would be slow, compared to the elasticity of the air, the result would be just what occurred, "the crown split across, and the fire descended into it." As to how the fire was communicated to the explosive compound, I know uot, but think the man, McKenzie, if living, could tell something about it. It has been said the gasholder was an old one, having been in use some ten or eleven years. I will say, in conclusion, that we have two holders that were made in the summer of 1838, and have been in use ever since, and now, to all appearances, are as good as when new.

BENJAMIN RANKIN.

Morandia's Patent Lamp-Lighter.

Messrs. Editors: I would like to call the attention of gas companies, and others having charge of street lamps, to Morandia's Patent Gas-Lighter. Having used them for the last two years I can recommend them as being just the thing needed to light street lamps with in wet weather. Equipped with one of these there is no excuse for not lighting every lamp during the greatest rain storm. These lighters are manufactured by Tufts Brothers, 42 Sudbury street, Boston; price, $1.25. SUPERINTENDENT.

Information Wanted.

NEW YORK, June 18, 1869.

Messrs. Fditors: I was taught to believe that it was impossible to go down to any great depth in water; that it became so dense as to float objects, hence the difficulty of sounding in the ocean etc. etc.

I doubt it now, and ask for information. Is this correct? I rely on you or your readers to answer,

Your obedient Servant,

GAS MAN.

A Problem to be Solved.

FORT WAYNE, IED., June 21, 1869.

Messrs. Editors: I would like to inquire of the engineering fraternity, about how much force it would take applied on the crown of a gas-holder to force it downwards, until the compression force of the contained gas should burst it outwards?

This should be a prize problem!

Yours, E.

Petroleum Lamp-Light.

In spite of the manifold and great improvements, in artificial lighting, the complaint is still to be heard that close eye-work by it readily fatigues the eyes and often hurts them, and that as regards comfort to the eye, lamp-light does not appear capable of replacing the light of day. It is, therefore, certainly a good subject for inquiry to find out the cause of this and some means of relief.

It is well known that all light used for artificial illumination is exceedingly rich in red and yellow rays, both of which have been proved to be eminently liable to disquiet and disturb the eyes; and in this the main cause of the evil complained of has hitherto been looked for. A remedy has been found in the exclusion of this excess of color by the proper arrangement of screens chromatically, so that the purified light need not differ preceptibly from sunlight. Much as this declorized light, however, may be preferable to the former, it is not in *those* rays that the principal causes of the bad effects are to be traced.

Petroleum light, for instance, is purer than that of the oil-lamp, and yet the complaint of ill-effects on eyesight from petroleum lamps are far more frequent than from any other kind of illumination. Which, therefore, is the cause? Radiation of light is always associated with that of heat, but the relative proportion may differ much. While more than half of the caloric rays of sunlight are likewise optically illuminating, those from the oil lamps have 90 per cent. of obscure, and only 10 per cent. of bright rays. Of the rays of ignited platinum, as much as 98 per cent., and of accohol 99 per cent., are dark, in electric light about 80, in gas-light about 90 per cent., while the flame of a Bunsen burner, though intensively hot, radiates scarcely any light or heat, but does the more the brighter the flame becomes. Here, as elsewhere, the light is produced by the white heat at which the particles of carbon are held suspended in the flame; whence less heat *within* the flame, more radiation *without*.

Now this bright flame of petroleum processes high radiation for heat, the obscure rays amounting to 94 per cent. It is this larger prorortion of dark rays which encumbers the eye in all artificial sources of light. But there are not wanting also the means by which lamp-light may be deprived of a very great part of its caloric effects. The most transparent glass is the least penetrable for a great proportion of caloric rays; such as is of a thickness of 2 or 3 millimetres absorbs as much as 40 to 60 per cent. of heat which radiates through it. Having, however, once passed through a plate of glass, the rays suffer little loss by going through another, but they will be almost altogether annihilated when the second passage is through *alum*, or *mica* equally as well. The light now becomes mild and beneficial to the eye, when thus freed from the greater part of its caloric effect by this simple means.

C. LANDSBERG in *Hanover Wochenblatt.*

Oil Yield in April.

The *Titusville Herald*, in its monthly report of oil shipment for April says: The shipments of crude equivalent by all routes from the reigion during April reached 282,280 barrels of forty-five gallons each, being a daily average of about 9,400 barrels. The shipment to New York and Cleveland were about the same as during the previous month, while to Philadelphia and Pittsburg they were considerably enlarged.

The shipments by river from all points were 56,472 barrels. This shipment was made at 40, 42 and 43 gallons. The following are the totals:

To New York, barrels	82,874
Cleveland, barrels	62,745
Boston, barrels	7,623
Philadelphia, barrels	17,710
Pittsburg, barrels	87,977
Portland, barrels	2,828
Other points, barrels	14,053
Total barrels	284,810
Difference between Crude & Refined shipped, bls.	6,470
Shipments of Crude equivalent, barrels	282,280

The following were the shipments from January 1st to May 1st, 1869, and the Crude equivalent:

To New York, barrels	325,445
Cleveland, barrels	308,501
Boston, barrels	37,799
Philadelphia, barrels	43,184
Pittsburg	250,017
Portland, barrels	12,178
Other points	80,598
Total barrels	1,047,722
Difference between Crude & Refined shipped.	25,459
Shipment of Crude equivalent, barrels	1,073,181

The price of petroleum was, on the whole, steady during April, as prices varied at the most but thirty-five cents. During the greater part of the month sales were made at from $5.40 to $5.60 along the creek, and at $6 at Oil City. At the close quotations were given at from $5.40 to 5.50 along the creek, being a decline of from twenty-five to thirty cents from the begining of the month.—*Pittsburg Evening Chronicle.*

The Indo-European Telegraph.

We learn from *Morgans' British Trade Journal* that the scheme projected for effecting communication between England and India by an overland system of telegraphs is likely to be completed within the present year. When the great engineering difficulties encountered in the progress of the enterprise are considered, such a project must, to all who take an interest in such subjects, be a source of agreeable anxiety and surprise, The obstructions which have presented themselves in the way of transport, and the situation of the ports from which carriage to required points could be arranged, are also to be regarded among the obstacles opposed to the speedy completion of the scheme. The line from London to Norderney, which constitutes part of the system, are in working order, and from Norderney to Thorn, on the Prusso-Russian frontiers, two wires are being constructed by the Prussian Government.

From Thorn to Balta, *via* Warsaw, the section will consist of 800 miles of line, which will be laid on posts of heavy timber, principally of oak. From Balta the system will be continued *via* Odessa to Kertch, on through the Crimea to Ecaterneador, and thence to a point which will correspond with the northern end of the Black Sea cable. This section, which will, as far as regards the land part, be constructed of iron posts, will be about 750 miles in length, and will comprise two cables—one 15 miles long, which will be submerged in the Straits of Kertch, and another, four miles long, which will cross the river Dnieper. The continuation of the system proceeds towards Tiflis and thence to Teheran, where it will join existing lines. In its course it may be added that it will comprise a three wire cable of about 100 miles in length, ending at Souchum Kaleh, the conductors of which will be of stranded wire covered with alternate layers of the mixture now known among scientific men as Chetterton's compound and gutta-percha, and will weigh a little over 270lb. per knot.

In order that the means of communication with India may be as complete as possible, it is intended to improve the lines at present constructed from Teheran to India. These agencies of correspondence proceed from Teheran *via* Ispahan and Shiraz to Bushire, on the Persian Gulf, and from that point to Kurrachee. The improvements to which reference has been made will include the substitution of iron for wooden posts on the lines from Teheran, the submergence of a cable about 500 miles long, from Bushire to Jask, and the completion of a land line from Jask to Kurrachee. The result of these extentions will be that two cables between Bushire and Jask, and a cable and a land line from Jask to Kurrachee will duplicate the facilities of communication through the whole of the Persian Gulf. The shore-ends of the Black Sea cable, which will probably be laid during the approaching summer are to be sheathed with heavy galvanized iron wires projected by tarred jnte. The section to which Teheran will form the eastern terminus will, it is expected, be completed by the end of next July. Meanwhile, the project for establishing complete surbmarine communication between this country and India is being vigorously promoted. Of the probable results of the competition of the rival systems there are but few data at present upon which to erect an opinion.

Foreign Gas Items.

We gather the following items from *Morgan's British Trade Journal* of July 2, 1869:

ANGLO-ROMANO GAS.—Dividend declared at the rate of 10 per cent. per annum.

BAHIA GAS—At the meeting the report was adopted, and the 3 per cent. per annum ordinary dividend declared.

GREAT CENTRAL GAS—The frauds upon the company committed by Higgs are stated at £71,214. The report of the board upon the subject was adopted at the meeting, and the retiring directors re-elected.

HONG KONG AND CHINA GAS—Interim dividend declared at the rate of 6 per cent. per annum, free of income tax.

IMPERIAL CONTINENTAL GAS—A dividend of £3 10s per share for the half-year has been declared.

SINGAPORE GAS—A dividend at the rate of five per cent. per annum has been paid.

Suit Against a Gas Company.

SUPREME JUDICIAL COURT—SUFFOLK, ss.

May 14.—GRAY, J.

Benjamin F. Dyer, et ux. v. The Boston Gas Light Company.—This was an action of tort to recover damages for personal injuries received by the plaintiff, Mrs. Dyer by an explosion of gas in the plaintiff's house on Dedham street. The explosion took place about twelve o'clock Sunday noon, December 28, 1869. The injuries received by Mrs. Dyer were severe and are likely to prove permanent. The gas pipe passed through a cess pool in the street and it was contended on behalf of the plaintiff that the pipe was rusted off and the gas escaped into the sewer whence it passed into the house. There was a conflict of testimony upon the question whether the gas pipe or drain was first laid in the street and whether there was any negligence of the company in this particular. It further appeared from the evidence of the plaintiff that in September, about three months before the accident, there was a leakage of gas, and that notice was given by the plaintiff to the meter taker of that fact. It was a matter in dispute between the parties whether the meter taker was an agent of the company authorized to receive such a notice. There was also evidence that on Sunday morning, the day of the explosion, notice was given to an agent of the company of the leakage of gas. The explosion took place about twelve o'clock of that day, and a third question for the jury was whether the company exercised reasonable diligence in preventing the explosion between the time of such notice and the time of the explosion. On the part of the defendants it was contended that the plaintiffs were negligent in remaining in the house when there was danger of an explosion.

The case was given to the jury on Thursday and yesterday morning they returned a verdict of $4000 for the plaintiffs.

Wm. Gaston and G. W. Park for the plaintiffs, and C. P. Curtis for the defendants.

Local Gas Items.

The village of Passaic is soon to be lighted with gas.

The common council has granted the Nassau Gas Company permission to lay mains in the streets of Brooklyn.

The Metropolitan Gas Light Company gave out notice that bids for the erection of a new retort house, would be received until the 7th. of July, 1869.

MALDEN AND MELROSE GAS LIGHT COMPANY—The annual meeting of the stockholders of this corporation was held recently, Mr. George P. Cox in the chair. The report of the treasurer and clerk, Mr. J. H. Converse, represented the affairs of the corporation as in a prosperous and satisfactory condition.

A committee of three was appointed to examine the treasurer's accounts, to investigate the management of the affairs of the corporation, and to ascertain if any reduction can be made in the price of gas.

The following named directors were unanimously elected:—P. P. P. Ware, E. S. Converse, G. P. Cox, J. H. Converse, E. Howe, G. G. Hubbard, J. G. Webster; clerk and treasurer, J. H. Converse.

Pacific Railroad Freight Tariff.

The San Fransisco *Bulletin* says: The Central Pacific Railroad Company have made up a 'Local Freight Tariff' for all stations between Sacramento and Promontory. with 'Rules and Regulations.' The rates are payable in United States gold coin per 2 000 pounds for all kinds of freight not otherwise provided for. There are 79 stations on the road, including Sacramento and Promontory, averaging 8¾ miles apart. The average charge per ton of 2000 pounds is 10 cents per mile, and about 8 to 10 per cent added; thus a ton of goods from Sacramento to Promontory, six hundred miles, is $71 50.

"The through price from Sacramento to New York, for first class freight, is $12 50 per 100 pounds, or $250 per ton. There will be particular rates for points beyond Promontory, the rates being about the same as the Central per mile, reaching to Omaha, 1,774 miles. Beyond Omaha there are two completing lines to Chicago, 2,268 miles—the 'Northwestern,' and 'Rock Island'—and rates will not probably go beyond one-half the rates per mile which are charged west of Omaha. The early summer fruits on the Pacific coast, which will bear trasportation, can be placed in the cities of the northwestern States at from 10 to 12 cents, and in the Atlantic States at from 12 to 15 cents per pound. Special cars will be provided by the companies, and the luscious grapes, cherries, peaches, and similar early fruits can be placed in those markets at least a month ahead of the eastern orchards.

The Magnesium Light.—Great expectations were raised with reference to this light as soon as a method was discovered for the cheap preparation of the metal. When magnesium is burned it emits a light quite unendurable to the naked eye, and it only remains to consider the most economical manner in which the combustion can be carried on. When the pure metal is employed it gives rise to a voluminous white cloud of the oxyd of magnesium, that obscures the reflectors and eventually fills the room where it is burned. Various attempts have been made to absorb this vapor, and thus remedy the difficulty. By alloying the magnesium with zinc the quantity of light is not diminished, and the fumes are more readily removed. An alloy with the new metal, thallium, has been very successfully tried. A lamp has been patented for burning finely divided magnesium mixed with sand, and made to pass through an hour-glass arrangement on to a small flame. The mixed sand and metal are then fed regularly into the flame, and the light emitted is very intense. In other lamps the magnesium, in the form of wire or ribbon, is unrolled from a reed and fed into the flame.—*Druggists' Circular.*

What Takes Place in Luminous Flames.

E. W. Hilgard, in *Silliman's Journal* for March, has an article on "luminous flames," a portion of which, in reference to certain exploded errors still taught in the books, we condense: Sir Humphrey Davy established the necessity of the presence of a solid incandescnt body to produce useful luminosity; and in reference to the flames of hydrocarbons in particular, he suggested that the liberation of the carbons in them was owing to the combustion of the hydrogen of the compound in advance of its carbon, the latter being heated to incandescence by an oxyhydrogen flame, as it were, and failing to be consumed until all the hydrogen was first oxidized. It is remarkable that an explanation so directly at variance with the daily experience of blacksmiths, and with a lecture experiment performed even in the most elementary course of chemistry, could so long have passed current; for the decomposition of steam by ignited charcoal into hydrogen and carbonic oxide gases is an old observation. In 1852, at Heidelberg, Bunsen suggested to me as an interesting subject of investigation, the composition of the gases in the various portions of the flame. I constructed a lamp adapted to the introduction of a section tube into the flame from below, and made a series of fifteen analyses of the gases so collected at various points of the interior cone of the flames of beef tallow, and of wax. My analysis showed the existence even in the highest portion of the cone, of free hydrogen with a large excess of carbonic oxide and carbonic acid; the amount of hydrogen varying but little from base to point, while the carbonic acid increases in about the same ratio as nitrogen, i. e., in proportion to the oxygen entering the flame. Bunsen as well as myself failed, however, to draw the legitimate conclusion from these facts, at the time. Landolt, two years later, took up the subject. He used illuminating gas of known composition, and was therefore enabled to determine the deficient factor in my analysis, viz., water; but he also failed to draw the inevitable conclusion as to what *must* happen in the luminour cone. Latter, Eunge likewise failed.

In June, 1860, Erdmann first distinctly enunciates that the carbon in a flame is oxidized *before* the hydrogen, and that the separation of carbon upon which luminuosity depends, is due to heat alone, as would be the case were the gas passed through a red hot tube.

Finally, eighteen months later, Kersten proves by eudiometric experiments that whenever a hydrocarbon is exploded with oxygen, insufficient to burn more than the carbon to carbonic oxide, no hydrogen at all is oxidized; but that as between carbonic oxide and hydrogen, the formation of carbonic acid on one hand and of water on the other depend upon "chemical mass," as Bunsen had already shown.

This question has therefore been settled by experiments, as much as eight years. Yet the latest editions of text-books published in this country still retain the old error regarding the succession of oxidation.

WORKS UPON GAS.

BOWDITCH.—THE ANALYSIS, TECHNICAL Valuation, Purification, and Use of Coal Gas, with illustrations., 8vo. cloth. Price, $6.25.

BOWER—Gas Engineer's Book of Reference, illustrated, 4to. Price, $1.00.

CLEGG—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. Price, $10.50.

COLBURN—The Gas Works of London, 12mo., boards. Price, 75 cents.

CROLL—Report of the Proceedings on the Arbitration with the Great Central Gas Consumers' Company, 8vo., cloth. Price, $2.50.

HUGHES—Gas Works and Manufacturing Coal Gas, 12mo. Price, $1.50.

MASON—The Gasfitters' Guide, paper. Price, 50 cents.

REISSIG—Handbuch fur Holz-und Forfgas-Belenchtung und einigen verwandten Belenchtungsarter (a very fine treatise upon Gas Works), illustrated, 1 vol. 4to., boards. $5.25.

RICHARD—Gas Consumers' Guide, 12mo., Price, 50 cents.

SCHILLING—Handbuch fur Steinkohlengas (one of the most elaborate works upon Gas and Gas Works), 10 plates and 310 wood cuts, 4to., boards. Price, $14.

SUGG—Gas Manipulation, with a description of the various Instruments and Apparatus employed in the Analysis of Coal and Coal Gas, 8vo., cloth. Price, $7.50.

WILKINS—How to Manage Gas, 24mo., paper. Price, 25c.

SCHILLING—Traite d'Eclairage par le Gaz. Price, $22.

For sale by

D. VAN NOSTRAND, Publisher,
23 Murray Street and 27 Warren Street
(Upstairs).

☞ Our new and revised Catalogue of American and Foreign Scientific Books, 56 p. 8vo., sent to any address, on receipt of six cents in postage stamps. 282

PROFESSOR HENRY WURTZ

HAS EFFECTED ARRANGEMENTS WHICH give him especial advantages in Analyses of Gas and Gas Coals, and in the practical determination of the value of Coal for Gas-Making purposes. Analyses of Ores, Minerals, Mineral Waters, etc. No. 26 Pine street, N. Y.; or this office

BERRY'S PREMIUM
FIRE PROOF BRICK WORKS.

Established in the Year 1812,
Baltimore, Maryland.

The Experience of FIFTY-SEVEN Years attests the Quality of our

Premium Fire Proof Bricks, Tiles, Etc.

which, with cement for laying the same, are constantly on hand in large quantities.

Our thorough knowledge of the materials we use, enables us to guarantee to IRON, COPPER, CHOME and GAS WORKS, also Refineries of Metals, Sugars, etc., etc., an exact size and form, with drawings or patterns sent us, for any Bricks ordered; which with

RETORTS,

will be furnished on short notice.

Office and Works bounded by Russell, Warner, Hamburg, and Cross Streets.

☞ Promptness and Dispatch given to all orders.

John S. & George R. Berry,
227-1y Baltimore, Md.

"SELLARS' CEMENT,"
FOR
Repairing Broken Fire-Clay Retorts,

WITHOUT REMOVAL FROM THEIR BEDS,

For piecing Retorts end to end that are too short for their beds stopping the cracks in Fire-clay and Iron Retorts; filling up the pores and small cracks round the mouth end of Clay Retorts; for fixing the iron mouth-piece to Fire-clay Retorts; patching cracks in Cast-iron ditto; making joints of Ascension Pipes; coating new Clay Retorts, and for general repairs at all times to prevent all possible loss of gas from leakage.

SOLE AGENT FOR THE U. S. OF AMERICA,

Messrs. HERRING & FLOYD,
742, 744, and 746, Greenwich Street, N. Y.

For shipment, "SELLAR'S CEMENT" is made up in Iron-bound packages, containing 3 cwt., 5 cwt., and 9½ cwt. cement, nett weight. Any one or number of these sizes of packages will be delivered, *carriage paid*, to any Gas Works in the United States at 12s. per cwt. Payment three months after receipt of goods, so as to give ample trial for proving its merits, according to the testimonials from some of the principal gas firms in Great Britain.
Send for a circular. 228-1y

GREAT IMPROVEMENT AND REVOLUTION IN
KEROSENE LIGHTS.

New houses furnished complete and old-fashioned Lamps improved or superseded by

IVES' PATENT LAMPS,

The safest, most convenient, and in every way *THE BEST LAMP EVER USED!*

Ceandeliers, Brackets, Hanging and Table Lamps of all kinds can be lighted as quickly as Gas, filled and trimmed safely and neatly, all without removing the Shade, Globe, or Chimney, or unscrewing the burner!

We have in stock a complete assortment of Foreign and Domestic

KEROSENE LAMPS AND FIXTURES,

Also, a choice selection of first class

GAS CHANDELIERS,

Fitted with our improvements for oil, and specially adapted for suburban residences which have been or are to be piped for Gas, but to which the mains have not yet reached, and oil is to be used temporarily, or they can be used elsewhere as well.

IVES' PATENT LAMPS are sold by dealers generally, but to introduce them where the merchants have not yet got them, we give particular attention to RETAIL TRADE, making a specialty of furnishing SAFE STATIONARY LIGHTS, APPROPRIATED FOR EVERY PLACE WHERE GOOD LIGHT IS REQUIRED.

JULIUS IVES & CO.,
37 Barclay street, and 42 Park Place,
227 Removed from 49 Maiden Lane.

WANTED IMMEDIATELY.

A GAS ENGINEER OF ABILITY, TO TAKE charge of small Test Works, make the Gas, exhibit the Light, and develope the Manufacture and Use of Gas upon Scientific Principles. Address, GEORGE FOX, Office GAS-LIGHT JOURNAL.

☞ *NEW METHOD*
FOR
LIGHTING AND EXTINGUISHING
Street and other Elevated Gas Lamps.

For Illustrated Circular containing particulars, with letter from the PRESIDENT OF THE MANHATTAN GAS-LIGHT COMPANY, and SUPERINTENDENT OF LAMPS AND GAS of the City of New York, address J. W. BARTLETT, Patentee of the AMERICAN SELF-GAS LIGHTING TORCH AND IMPROVED KEY, 569 Broadway, N. Y. 2.8

Youghiogheny Coal Hollow Coal Co.

OFFER THEIR

SUPERIOR GAS AND STEAM COALS

To Gas-Light and Water Companies throughout the country.

John S. McMullin, Pres. Fred. B. Hubbell, Sec'y & Supt

Office 423 Walnut Street, Philadelphia.

L. F. Mellen & Co., Agents, Cleveland, O.

Refer to following consumers:—Buffalo Gas Company, Detroit Gas Company, Peoples Gas Company, Chicago, Fort Wayne Gas-Light Company, Brooklyn Gas Company, Jersey City Gas-Light Company, Cleveland Gas-Light Company.

R. M. FRYER & CO., ENGINEERS AND CONTRACTORS, No. 266 Broadway, New York, complete new inventions and put them in practical operation, and when desired secure them by Letters Patent in this and foreign countries, through the agency of the most appropriate Patent Solicitors for their class. We also arrange for WOOD-CUTS, STEREOTYPES, ELECTROTYPES, ADVERTISEMENTS, etc., and insert them in Scientific Journals. Drawings and Specifications furnished, with estimates, free of charge, to parties wishing to erect or fit up any class of manufacturing establishments, and for which purpose we will select any particular style of or makers of machinery, as we are enabled to obtain all such at the very lowest prices, on account of our vast acquaintance in manufacturing circles.

NOTICE.—Manufacturers of our line of goods who have not already had communication with us will please forward us descriptive and price list of the goods manufactured by them, that we may show our customers that no additional charges are made to your standard list. 226

RILEY A. BRICK,

MANUFACTURER OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

GAS WORKS & MACHINERY CASTINGS

Of Every Description.

No. 89, White Street, New York.

THE NEWBURGH
ORREL COAL COMPANY,

Mines at Newburgh, Preston County, West Va.
Company's Office, No. 52 S. Gay street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. G. W. MAHOOL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
W. D. CRANE & Co., 26 Kilby street, Boston.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 224-1y

PRACTICAL SUPERINTENDENT.

THE ADVERTISER IS A PRACTICAL MECHANIC and Engineer, fully familiar with Gas Making, Distribution, etc., and competent to put up all apparatus in connection with Gas Works. First class reference will be given.

Parties desirous of the services of the advertiser will please address "Practical Superintendent," care of Gas-Light Journal, 22 Pine street, N. Y. 226-tf

TO GAS COMPANIES.

A SITUATION AS SUPERINTENDENT OR ASSISTANT, or to superintend the erection of a new Works is wanted by a young man who has had many years experience, and who thoroughly understands the business. He is a good accountant and draughtsman, and has no objection to any part of the Union. Good references. Address, P. W. X., office American Gas-Light Journal. 227-4t

THE

AMERICAN GAS-LIGHT JOURNAL,

AND

CHEMICAL REPERTORY.

Published on the 2d and 16th of Each Month

At No. 22 Pine Street, New York.

M. L. CALLENDER & CO.,

EDITORS AND PROPRIETORS.

Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

FRIDAY, JULY 16, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers olicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

CONTENTS

The Latest Gas Machine 17
Impure Water 18
Chemical Repertory 18
The Utilisation of Small Coal 20
CORRESPONDENCE—
Explosion of the Meter at the Cincinnati Gas Works 21
The Gas Explosion at Cincinnati 21
Morandia's Patent Lamp Lighter 21
Information Wanted 21
A Problem to be Solved 21
Petroleum Lamp Light 11
Oil Yield in April 22
The Indo-European Telegraph 22
Foreign Gas Items 22
Suit Against a Gas Company 22
Local Gas Items 22
Pacific Railroad Traffic 22
The Magnesium Light 22
What Takes Place in Luminous Flames 23
EDITORIALS—
Oxyhydrogen Light—Is it a Success? 24
The Massachusetts Legislative Fiasco 24
"Hearth and Home" 24
Answers to Correspondents 24

JOB PRINTING.

STOCK CERTIFICATES,
ASSESSMENT RECEIPT BOOKS,
TRANSFER JOURNALS,
CIRCULARS,
HAND BILLS,
CARDS,
BILL HEADS,
BLANK FORMS FOR GAS COMPANIES,

And every kind of Job Work that may be desired, executed at the office of The AMERICAN GAS-LIGHT JOURNAL, No. 22 Pine street, New York.

OXYHYDROGEN LIGHT—IS IT A SUCCESS?

Any artificial light must have the elements of simplicity, in order to be acceptable and popular with the public masses. Its mechanical arrangement must be so easily understood that servants and children can light and extinguish it, and readily understand its arrangement, and the conditions which govern its proper operation.

The oxyhydrogen light does not seem to meet these requirements in any particular. It requires in the first place, *two* pipes for distribution—one for the oxygen and one for the hydrogen, or coal gas as the case may be. This will double the expense of introduction in such new buildings as are adapted for it in the erection. In buildings already completed the expense will be much greater.

If the oxygen is to be conveyed from the manufactory to the consumers through street mains, the obstacles to such a radical upheaval and excavating are too apparent to require mention.

THE BURNER, PRESSURE ETC.—When we consider the frequent accidents that occur through the mismanagement of the common and exceedingly simple mechanical arrangement of the present gas burners, what is to be the probable result of substituting the complicated apparatus involved in the oxyhydrogen burner. In all the history of this light, even when manipulated by those who are skilled, and who have made it a study, we find on record a constant series of accidents and mishaps, until the attempt to mix the gases in one pipe has finally been abandoned, owing to their well known tendency to explosion. Even the mixing chamber at the jet or burner in present use, is subject to explosions, as will be observed whenever the gas is being let on or turned off, caused by the reduced pressure, which lets the flame travel back into the pipe as often as it becomes filled with the gases, thereby producing a series of explosions or detonations.

If oxygen is condensed into cylinders for transportation to the places where it is to be used, the pressure at first is very great, and constantly diminishes when being used. This involves almost constant attention to, and manipulation of the cocks regulating the jets or burners, or they would soon become extinguished. How would this do in a hotel for instance, of several hundred rooms and as many burners?

If city or coal gas as now distributed, is used with the oxygen flame, which is the method proposed, each building will require to have a supplementary or auxilliary gas-holder; because the pressure requires to be five or six times greater than the ordinary pressure in the street mains. This holder needs to be filled and then extra weighted, after disconnecting or shutting off the supply from the street main.

The high pressure required both for the oxygen and other gas, will involve a great loss by leakage. The low pressure, 4-10 inch water pressure now necessary for coal gas, causes a loss by leakage, etc., of from 10 to 15 per cent.; more generally the percentage is nearer the latter amount than the first. Now increase the pressure six times and what loss may be estimated? It is safe to say three times the amount at least.

DANGER OF EXPLOSION AND SPONTANEOUS COMBUSTION.—The greater liability to leakage will involve a greater liability to accident by explosion, caused by gas escaping into basements and rooms not largely ventilated. The amount of coal gas required to produce an explosive mixture with oxygen is far less than with atmosphere alone; the ratio being as five to one nearly.

Increasing the proportion of oxygen in an apartment one-tenth in total volume, will cause the merest spark to burst into intense combustion and flame. The effect upon a segar stub, dropped carelessly, would be a conflagration. Such an atmosphere would ruin all the insurance companies in the land.

The atmosphere of such a room would produce the most serious consequences upon the physical system, such as hurried respiration, great mental and physical excitement, with intense febrile symptoms, resulting finally in insensibility, asphyxia and death.

ACTUAL COMPARATIVE PHOTOMETRIC POWER.—In all estimates of the comparative photometric power of this light, there seems to have been one or two essential elements left out of the calculation, which materially modify the actual practical service of the oxyhydrogen light. The oxyhydrogen light is eminently one of intensity and not of diffusibility or quantity. On the contrary coal gas is eminently one of diffusibility and quantity. Those familiar with the application of the terms "*intensity*" and "*quantity*," as applied to electricity, will readily understand the application as to light: and with all the more propriety, if as has been asserted, light is only one of the various forms of electrical phenomenon.

Light, in order to be of the most practical utility and value, must be sensible and agreeable to the eye, and give a sense of gratification. It must permeate and diffuse with a mellow glow and softness, which reacts upon the optic nerve as a sweet and melodious symphony in music upon the *auditorium*.

The oxyhydrogen light lacks these attributes. It is harsh, sharp, and grating. It cuts into the optic nerve with a blinding glare, and stuns the sense of sight till every object appears confused. Just as the crash and shriek and blare of an orchestra playing out of tune and time shocks the ear and dulls it to all other melody.

The effect of this light upon the sight is similar to the reflection of the rays of the sun on the snow in high latitudes, producing a kind of *snow-blindness*.

Hence it will be understood the oxyhydrogen light, owing to its intensity and want of diffusibility, requires to be toned down so as to be supportable and natural to the eye. This is done by interposing globes or plates of porcelain, ground glass, or other semi-transparent media. This, of course, reduces the intensity, and serves to diffuse the light; but at the same time greatly reduces its real practical photometric or illuminating power. It is in this condition that all comparative tests of its power and value with gas or other artificial light should be made, in order to get a fair estimate of its value for general practical purposes of illumination.

The interposition of the indispensable porcelain and heavy ground glass and enamelled globes, etc., reduces the photometric power of the oxyhydrogen light from 50 to 80 per cent., and even more.

THE PENCIL OR CRAYON.—This is a mineral substance made in the cylindrical form of a pencil or crayon. Formerly it was lime, hence the term "Lime Light," subsequently magnesia, magnesian-limestone or dolomite, and various combinations of these and other materials were molded into form and used owing to its greater durability when subjected to the great heat of the oxyhydrogen flame.

Still later, the mineral zircon (a species of *hyacinth*) has been employed, and great stress is laid upon its "*indestructability*," which is in no wise proved; and when we reflect that Sir Humphrey Davy easily dissipated *the diamond*—by far the most refractory substance, before the oxyhydrogen flame, the folly of claiming such wonderful properties in zircon (a mineral of much lower grade), must be too apparent to require further argument.

The crayon is *gradually* but *surely* consumed, and

requires frequent adjustment, It is also subject to crack and break off, after exposure to moist or changeable atmosphere, when first heated or lighted. The jets of oxyhydrogen and other gas used, require a very nice relative and proportionate adjustment, in order to insure a good light; on this account not unfrequently the light is intractable, and will not burn, or suddenly extinguishes when burning, even in the hands of the educated expert. What then is likely to be the result of placing the management of this light in the unscientific hands of servants and others?

OTHER METHODS OF LIGHTING BY OXYGEN.—The scientists of Europe and America have long been engaged in experimenting to obtain the great desideratum—cheap oxygen.

There are about a score of English, fifteen French, and ten or twelve American patents for methods of lighting by oxygen. M. Bousingault, a distinguished chemist of the Academy of Science, Paris, first employed the byoxyd of barium as a substitute for the byoxyd of manganese, which had previously been used for this purpose. His process was quite similar in principle to the process now before the public of M. Tessie du Motay, and consisted in the expulsion of oxygen, and its reabsorbtion from the atmosphere, under different degrees of temperature. M. Mallet, of France, also employed protochloride of copper in a similar manner. In both cases, as well as that of M. Tessie du Motay, the same material is used over and over again, it is said, *ad infinitum*.

WHEN A FINAL SUCCESS.—In all these methods of producing oxygen by (oxydizing and deoxydizing) charging and discharging oxygen from substances having this property, when subjected to high temperature, it must be apparent to a reflecting mind that the process itself involves a radical defect—an obstacle to a permanently economical operation. If the manganese oxydizes so will the retorts in which it is treated, and so will all the pipes and connections thereto. This will necessitate constant renewal of the retorts and apparatus, which will most materially affect the estimate of *cost* in the long run.

When oxygen has been produced *continuously* in *large quantities*, and has been employed to light up a city or a *town* even, in a practical manner *continuously* and *economically compared with coal gas*, for a period of even months, then may the oxyhydrogen light be considered a "success," and not until then.

THE MASSACHUSETTS LEGISLATIVE FIASCO.

Through an oversight of the printer—undetected in consequence of the present writer's absence from town, while the last issue was going to press—a concluding paragraph, giving the final result of the above business, was left out. We must therefore repeat its substance here. Those who keep files of the Journal and wish to have this history complete, are advised to cut out the slip and paste it in its place in the last issue.—H. W.

[Some extracts are appended, chiefly from reports of cases in the *London Gas-Light Journal*, which we are obliged to omit.]

The effect of the Report of the Special Committee was the rejection of the proposed bill by the Senate, by a vote, we are told, of 3 in the affirmative to 34 in the negative.

"HEARTH AND HOME."—We cannot refrain refering to this most excellent Journal. An illustrated weekly of 16 handsome folio pages, devoted to tht interest of the farm, garden, and fireside.

It is edited by Donald G. Mitchell and Harriet Beecher Stowe, assisted by a choir of able editors and contributors in all departments.

Its original articles by American writers, of acknowledged ability, upon all subjects proper to the Journal, including a well sustained literary department, is a new and valuable feature in Journalism.

We forsee a splendid success for this most valuable Journal, and wish it may find its way into the house of every one of our countrymen.

Messrs. Pettingill, Bates, & Co. are the enterprising publishers of this valuable Journal at 37 Park Row, New York.

☞ We have received a copy of the monthly report of the department of agriculture for May and June 1869, from which we shall make some extracts of interest to our readers.

Also a copy of the annual report of the Sewerage and Water Commissioners for the city of St. John, East side, and parish of Portland for the year 1869.

☞ On reference to the advertisements of Messrs. R. D. Wood of Philadelphia, it will be seen that Mr. S. H. Henderson has been appointed their selling agent, and has opened an office at 173 Broadway, 2d floor, where all orders for cast iron gas and water pipes will be strictly attended to.

Answers to Correspondents.

S. C. of Omaha Nebraska.—In answer to your question to know a rule for calculating the chord of a circular arc, length of the arc, and diameter of the circle given, without doing it by Trigonometry, we refer you to the following answer:

You can determine the length of the arc, if you have access to a table of natural sizes in the following manner:

1st. Multiply the given diameter by 3.1416; this will give you the circumference of the circle.

2d. Divide the length of the chord by the given diameter, and find the quotient in the table of natural sizes, or the number nearest to that quotient (the division should be carried to as many places of decimals as the numbers in the table); take the number of degrees and minutes in the margin and head of the table, corresponding to the number then found.

3d. Reduce the number of degrees and minutes thus found (if it contains minutes) to minutes, and multiply by the circumference already found and divide first by 60, then by 180; or, if the number contains only degrees, multiply it by the circumference and divide by 180, the quotient will be the length of the arc required; that is it will be the length of that part of the circumference cut off by the chord which is less than a semi circle. If that number be then substracted from the whole circumference, the remainder will be the arc on the other side of the chord, and consequently greater than a semi-circle.

It may be added that most of the hand book of mechanics, such as Nystrom's, Haswell's etc. contain tables from which you may obtain the length of any segment of a circle, knowing its *height* and the length of its *chord*.

NOW READY FOR DELIVERY.

Fodell's System of Book-keeping for Gas Light Companies

SUBSCRIBERS PREFERRING TO HAVE THEIR copy sent by mail will please notify us, and enclose 15 cents in stamps for postage, otherwise they will be sent by Express.

Subscribers who have not prepaid will please send Post Office Order for $3.15, which will insure them the book by mail.

The regular price to non-subscribers is $5, which should be sent either in Check, Post Office Order, or Registered Letter.

M. L. CALLENDER & CO.,
Office GAS-LIGHT JOURNAL, 22 Pine st., N. Y.

TO GAS COMPANIES.

WANTED A SITUATION AS SUPERINTENDENT by a practical man, who has had over 15 years experience in the Manufacture and Distribution of Coal Gas. Is competent of making alterations or extensions. Can produce the best testimonials as to ability. Address J. J. B., office of AMERICAN GAS LIGHT JOURNAL, 22 Pine Street, New York.

BOOKS ON COAL GAS.

BOWDITCH, W. R.—THE ANALYSIS, TECHNICAL Valuation, Purification, and Use of Coal Gas illustrated, 8vo. cloth. $6.25.

BOWER, G.—Gas Engineer's Book of Reference, illustrated. 4to. 75 censs.

CLEGG, S.—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. $10.50.

COLBURN, Z.—The Gas Works of London, 12mo., boards. 75 cents.

MASON, J.—The Gasfiters' Guide; paper. 50 cents.

RICHARD, S.—Gas Consumers' Guide, 12mo. 50 cents.

BANISTER, H.—Gas Manipulation, with a description of the various Instruments and Apparatus employed in the Analysis of Coal and Coal Gas, enlarged by W. T. Sugg, 8vo., cloth. $7.50.

WILKINS, F.—How to Manage Gas, 24mo., paper. 25 cents.

KIDD, J.—Coal Gas, its History Application, and Economical Use, Illustrated, 16mo., 25 cents.

PERKINS, E. E.—Practical Treatise on Gas and Ventilation. Illustrated, 16mo., $1.25.

For Sale by **WILLIAM WOOD, & CO.**
Publishers, Booksellers, and Importers,
61 Walker Street, New York.

R. D. WOOD & CO.

MANUFACTURE

CAST IRON GAS AND WATER PIPES.

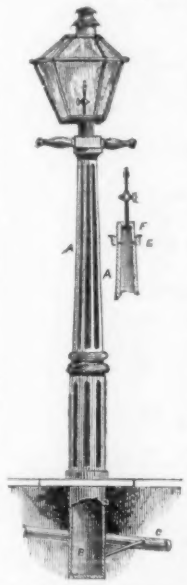
PHILADELPHIA.

On hand, several thousand feet 3, 4, and 6 inch Pipes, for immediate delivery. 226–6m

S. H. HENDERSON, Selling Agent,
No. 173 Broadway, New York.
SECOND FLOOR.

Graham's Patent Lamp Post.

ANTI-FREEZING.



MORE SIMPLE, MORE CHEAP, MORE USEFUL LESS LIABLE TO GET OUT OF ORDER, and gives a more PERFECT LIGHT than any other Lamp Post known. It is the ONLY REALLY ANTI-FREEZIFG LAMP POST ever offered to the public. The improvement is applicable to OLD POSTS at a TRIFLING COST.

The invention consists mainly in dispensing with the interior gas pipe, by simply closing the bottom of the Lamp Post and tapping it five inches from the bottom for the service pipe. The top is fitted with a plug or stopper to take in a short piece of pipe with the stop-cock and burner. The interior of the Post thus forms a large gas chamber and condenser for all moisture and impurities which fall to the bottom, leaving the gas free and pure at the burner.

For manufacturing rights and rights to use, or other information, address

J. W. GRAHAM, Chillicothe, Ohio, or
EDITORS AMERICAN GAS-LIGHT JOURNAL, 22 Pine st., N. Y.

THE PATENT

INSTANTANEOUS "GAS LIGHTER."

Adapted especially for Lighting and Extinguishing Street and all Elevated Gas Lamps.

☞ Witness its operation by the Manhattan Gas-Light Company, now lighting 7,000 Street Lamps of New York City.

J. W. BARTLETT, Patentee,
1-tf 569 Broadway, New York.

PURIFICATION OF GAS BY OXIDE OF IRON.

THE UNDERSIGNED ARE PREPARED TO treat with Gas Companies for this Valuable Material for the Purification of Gas, made from Bituminous Coals. It has been used for one year without Lime, with good results.

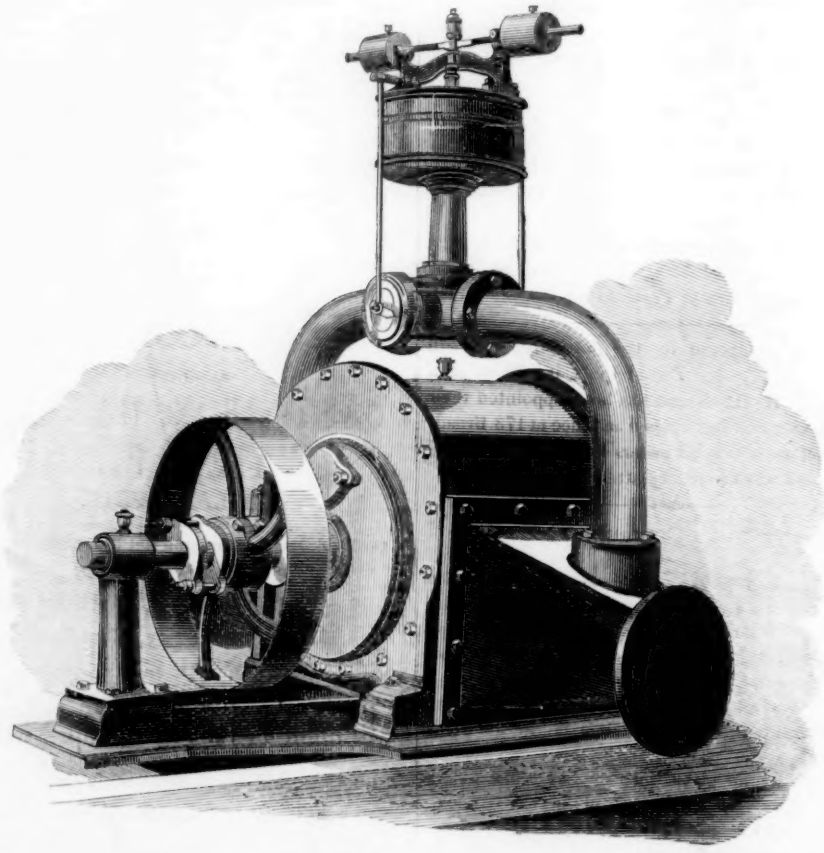
Individual, Corporation, Town, and State Rights can be purchased at prices to suit. Apply to

WM. H. ST. JOHN,
PETER CARTWRIGHT. } Patentees.

New York Gas Works, 21st Street and Av'e A. 224–3mos

Smith & Sayre Manufacturing Company.

The Mackenzie Patent Gas Exhauster,
AND PATENT COMPENSATOR.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address

B. KREISCHER., President.
JAMES AYRE, Treasurer,
CHARLES W. ISBELL, Secretary. Office, 95 Liberty street, New York.

KEYSTONE IRON WORKS,

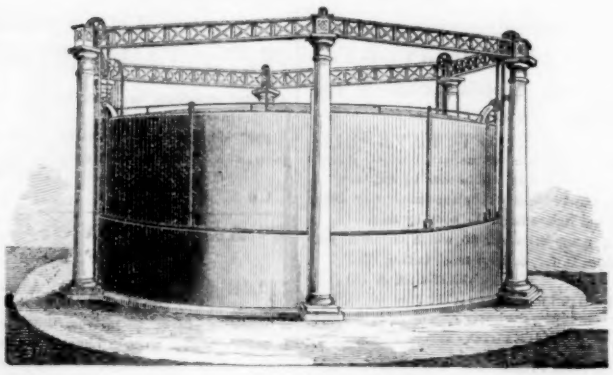
2132 Filbert Street, Philadelphia.

G. W. KRAFT, PROPRIETOR,

MANUFACTURES

GASOMETERS,

COAL CARS, PURIFYING OXES, COKE BARROWS.



RETORT HOUSE ROOFS, WATER TANKS

Wrought Iron Work for Bridges, Buildings, Steam Boilers, Tanks, Stills, &c.
Particular attention paid to Alterations and Repairs.

LUDLOW VALVE MF'G CO.

OFFICE 193 RIVER ST., TROY, N. Y.

Make Valves ¼-inch to 24 inch, for Water, Steam & Gas.

FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

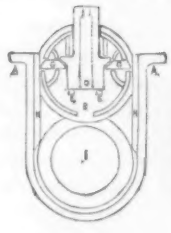


FIG. 3. FIG. 2.

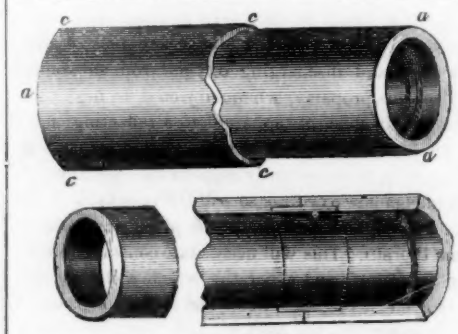
[From A. F. Havens, Engineer Brooklyn Gas-Light Co.]

"I take great pleasure in saying that they give perfect satisfaction—opening easily and quickly, and requiring no effort to start them, even after they have been closed for months."

[From R. E. Roberts, Secretary Detroit Water Works.]

"Commenced using your valves in 1866; have over 200 in use: have given satisfaction."

☞ More than 80 Gas and Water Companies have them.
Send for Descriptive Circular.



WYCKOFF BROS. & CO.,

ELMIRA, N. Y.

MANUFACTURERS OF

WYCKOFF'S PATENT IMPERISHABLE

Wooden Water and Gas Pipe.

These Pipes combine

Strength, Durability, and Economy.

The Water Pipes are the cheapest and best in use for watering Cities and Villages, conveying water to Railroad Tanks, Distilleries, Breweries, Tanneries, and water courses of every description. Wyckoff's Patent Gas Pipe is less expensive than other kinds, more serviceable and more durable; being coated, inside and outside, with imperishable material, and impervious to air, gas or water, and warranted to give satisfaction. 219tf

MITCHELL, VANCE & CO.

Manufacturers of

CHANDELIERS

And Every Description of

GAS FIXTURES.

Also Manufacturers of

Fine Gilt, Bronze and Marble Clocks, Warranted best Time-keepers, Mantle Ornaments, &c.

SALESROOM, 597 BROADWAY,
(Rear Entrance 140 Mercer Street.)

Special designs furnished for GasFixtures for Churches, Public Halls, Lodges, &c. } New York

CHAS. HOWDON SMITH,

BROKER IN MINING STOCKS

AND OTHER SECURITIES,

No 165 BROADWAY,
NEW YORK.

PRINCE'S METALLIC PAINT.

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though said at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, ouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral aints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Five Cents per Pound.

A liberal discount made to parties purchasing by the ton.

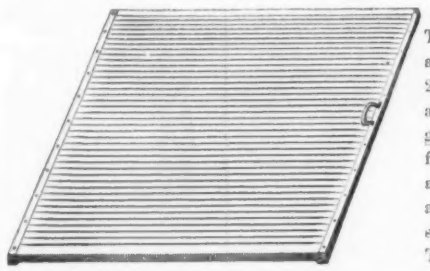
A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN & CO, General Agents
115 LIBERTY STREET, NEW YORK.

JOHN L. CHEESMAN,

MANUFACTURER OF PATENT CONICALLY SLOTTED SOLID WOOD TRAYS.



☞ The advantages of thes Trays over those made of iron, are economy (they being over 200 per cent cheaper than iron, and will last twice as long), a greatly increased purifying surface, and a saving of time and and labor in removing the lime, as it does not adhere to the smooth surface of the Wood Trays, as is the case with the iron. JOHN L. CHEESMAN, 147 and 149 Avenue C, New York.

MANHATTAN

Fire Brick & Enamelled Clay Retort Works.

MAURER & WEBER,

(Of the late firm of B. Kreischer & Co.)

PROPRIETORS

Office & Works in 15th street, Avenue C,

MANUFACTURERS OF

Fire Brick and Tiles,

OF ALL SHAPES & SIZES,

Fire Mortar, Clay and Sand.

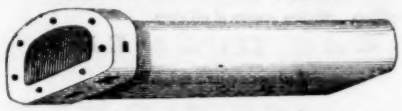
☞ Articles of every description made to order, at short notice. (135

HY. MAURER. ADAM WEBER.

NEW YORK

Fire Brick and Clay Retort Works

☞ *Established in* 1845. ☜



(Branch Works at Kreischerville, Staten Island.)

B. KREISHER,

Office 56 Goerck St, cor. Delancey, New York.

GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes.
FIRE MORTAR, CLAY, and SAND.
Articles of every description made to order at the shortest notice.
B. KREISCHER.

JOSEPH K. BRICK, EDWARD D. WHITE.

J. K. BRICK & Co,

BROOKLYN CLAY RETORT, AND FIRE BRICK WORKS,

VANDYKE STREET, BROOKLYN, N. Y.

J. H. GAUTIER & CO.,

JERSEY CITY FIRE BRICK WORKS

MANUFACTURERS OF CLAY GAS RETORTS,

Tiles, Blocks, and Fire Bricks.

☞ WORKING DRAWINGS

OF SETTINGS FOR BENCHES OF THREE, FIVE AND SIX RETORTS FURNISHED FREE TO ANY GAS COMPANY.

Greene, Essex and Bergen-sts., Morris Canal Basin, Jersey City New Jersey. (208t

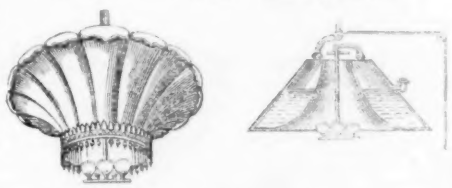
Philadelphia Fire Brick Works,

Corner of Vine and Twenty Third sts., Philadelphia,

JOHN NEWKUMET,

Manufacturer of all kinds of FIRE-BRICK, GAS-HOUSE TILES, to suit all the different plans in use. Clay Retorts and Dentist Muffles. Orders filled at short notice.

The New Light.



$500 REWARD

Will be paid to any one who can produce from OXYGEN GAS or any other source, a light as cheap as that supplied by the Hydrocarbon Light Company, or that can prove that one foot of New York gas cannot be made by their process to give a light equal to three feet. Suitable for all purposes of illumination. May be seen in practical operation at the Company's store, 74 Maiden-lane, or at 839 Broadway, New York, and Messrs. Oppenheim & Co.'s, 251 Fulton street, Brooklyn. 219

JERSEY CITY

GAS METER WORKS.

R. M. POTTER & CO.,

MANUFACTURERS OF

CONSUMERS GAS METERS, WET AND DRY, Station Meters, Center Seals, Governors, Pressure Registers, and all kinds of Pressure Gauges,

Experimental Meters and Standard Test Gasholders.

☞ And all apparatus in use at the Gas Works. ☜

14 Morris St., Jersey City, N. J. (1y.

PATENT LAMP POST.—THIS INVENTION relates to constructing Lamp Posts in two parts, viz. A base which is set in the ground, and a column or upper part which fits into the upper end of the base. By making Lamp Posts in this manner a great saving may be made in the original cost of the post, and in case the upper part of the post is broken, it is easily replaced by a new one, without the trouble and expense of digging up the old base, which frequently has to be delayed from inclemency of the weather. There is a collar around the upper end of the base, on which the base of the upper part rests. The sleeve has a number of lugs or chipping pieces projecting from its sides, which can, in a few minutes, be chipped off sufficiently to let the sleeve fit the base, no other tools being required but a hammer and chisel. In case the upper part of the post is broken so that it cannot be repaired the base is saved, which is one-third the cost of the post. In case the gas pipes become stopped by freezing or any other cause, the column can be lifted out from the base, the gas pipe (or stand-pipe) detached, the obstruction removed, and all put up in good order in the space of twenty or thirty minutes, which is a great advantage over the old posts. A cock can be put on the upper end of the bend of the gas pipe, and in case of breakage can be turned so as to shut off the gas. This is also no small item, and cannot be done with the old post. A stronger, lighter, and better casting can be made, and at the same time more sure to turn out better than the old posts.

The right to manufacture, or State rights, for sale on reasonable terms. Address DENNIS LONG & CO., Union Pipe Works and Union Foundry and Machine Shops, Louisville, Ky. 221-tf

AVERY & CO.,

SPRINGFIELD, MASS.

VALVE GAS BURNER

TO REGULATE THE FLOW OF GAS & SAVE IT.

It is unrivalled in this respect. Try it and see. 218-2m

ALFRED BLISS, JAMES ROOT, ALBERT F. NYE.

ALFRED BLISS & CO.,

Manufacturer of and Wholesale and Retail Dealers in

CHANDELIERS,

And Every Description of

GAS FIXTURES,

Coal-oil Chandeliers & Lamps in Metal

With a Complete Assortment of

Glass, Paper and Porcelain Shades.

☞ BLISS' PATENT CENTER LIGHT SLIDE CHANDELIER

Manufactured Solely by us.

Warehouse and Manufactory, 95 Bleecker Street, New York. [99

LACLEDE FIRE BRICK

AND

CLAY RETORT WORKS

CHELTENHAM, ST. LOUIS CO, MO.

HAMBLETON & GREEN

PROPRIETORS,

Office, No. 1007, North Levee,..... St. Louis.

HOY, KENNEDY & CO.,

ENGINEERS AND CONTRACTORS

For the Erection or Extension of Gas Works.

PLANS, SPECIFICATIONS AND ESTIMATES.

MANUFACTURERS of every kind of Gas Machinery, Retorts, Bench Castings, Wrought Iron Work, Multitubular and Air Condensers, Washers, Scrubbers, Purifyers, Exhausters with every equipment complete for large or small Works, Gasholders, Telescopic or Single; Iron Roof Frames with Cornice Gutters, covered with Corrugated Iron or Slate; Iron Doors and Iron Pivot Blind Windows; Coke Barrows, Fire Tools, Retort Lids, Cotter Bars and Screws, Stop Valves, Pressure Governors for Street Mains, and Compensators for Exhausters that are unrivalled for unvarying accuracy; Steam Engines, Boilers, Etc., Etc.

Agents for G. W. EDDY'S PROCESS for removing Carbon from Retorts.

HAYWOOD'S Dry Gasholder for Railroad Cars and Steamboats.

Post-Office Box 2,348. Office, 98 Liberty st., N. Y. (224-1y

JOHN P. NESSLE. JAMES A. TAYLOR.

Nessle & Taylor,

MANUFACTURING ENAMELERS

OF

IRON AND OTHER METALS.

97 Water street, Brooklyn. 171tf

JOSEPH NASON & CO.,

No. 61 Beekman street, corner of Gold,

NEW YORK.

Manufacturers of WROUGHT IRON PIPES and Fittings for Steam, Gas and Water, Boiler Flues, Steam Boilers, Coils, Heaters, Evaporators, Pumps, Ventilating Machinery, and Apparatus for Warming Buildings by Steam and Hot Water.

OIL TUBING, CAST IRON DRIVING PIPE, Boring Tools, Oil Pumps, Sand Pumps, Stuffing Boxes, Tongs, Clamps, Swivels, Joints, &c. 131

HOW TO SAVE FUEL.—KEEP WARM.

THE ADVERTISER IS THE INVENTOR AND Patentee of a new System to Utilize Waste Steam for Heating Factories, Mills and all buildings where steam power is used. Also, for Dyers, Soap Makers, Etc. The saving in Fuel is from 25 to 40 per cent! which can be proved by numerous testimonials of those who are employing this system. Orders to have the system applied may be directed to Joseph Shackelton, 22 Pine-st., Room 10, or at 45 Courtlandt-street, New York.

Appended are a few of the many Testimonials received :—

Newark, July 21, 1868.

Mr. Joseph Shackelton has just completed an arrangement by which we are enabled to apply the exhaust steam from our engine for the purpose of heating water used for dyeing, felting, scouring and other purposes. We have made a careful test of the amount of fuel saved by the use of this arrangement, and find it to be from forty to fifty per centum. MOORE & SEELY BROS.

Newark. N. J., December 18, 1868.

Mr. Joseph Shackelton—Sir: This is to certify that I am using your system of using the exhaust steam from my engine. It has been in operation for three months, and works satisfactory in all respects. I find a saving of coal of about 50 per cent.

JOS. GUILAM.

We have used Mr. Shackelton's patent system of heating our kettles and factory by exhaust steam for seven months We find that there is a saving of coal of about 50 per cent.

218tf YATES, WHARTON & CO.

GEO. STACEY. HENRY RANSHAW. WM. STACEY.

GEO. STACEY & CO.,

MANUFACTURERS OF

GASOMETERS,

Wrought Iron Roofs.

And all kinds of Wrought Iron Work used in the erection of Gas and Coal Oil Works, Wrought Iron Bridges for Railroads and other purposes, Wrought Iron Joists and Girders for Buildings, Bridge Bolts, Jails, and Cells, Etc.

Manufactory, Ramsay street, opposite O. & M. R. R. Depot,

CINCINNATI, O.

REFER TO:

Cincinnati Gaslight Company
Cleveland, O., Gas Company.
Davenport, Iowa, Gas Co.
Nashville, Tenn., Gas Co.
Madison, Ind., Gas Company.
R. T. Coverdale, Engr., Cin.
Covington, Ky., Gas Company.
Baton Rouge, La., Gas Co.
Indianapolis Gas Company.
Dayton, O., Gaslight Company.
Terre Haute, Ind., Gas Co.

Roofs covered with either Corrugated Sheet Iron or Slate. 1y

ASHCROFT'S

Patent Low-Water Detector

FOR PREVENTING THE EXPLOSION OR

Burning out of Steam Boilers.

More than 7,000 of these Instruments now in use.

PRICE, $50.

The Detector insures your boiler against burning out or exploding, and against the collapsing of flues, which is caused by low water.

205tf JOHN ASHCROFT, 50 John-street, New-York.

BAY STATE FIRE BRICK

—AND—

CLAY RETORT WORKS.

CHELSEA, MASS.

DAVIS & CHADDOCK,

MANUFACTURERS.

Office Nos. 125 and 127 Water-st., Boston.

Also agents for the sale of J.K. BRICK & Co's, Clay Retorts, Fire-Brick, Gas-House tile, etc. 66tf

REMOVAL.

THE

EMPIRE SEWING MACHINE COMPANY

HAVE REMOVED TO THEIQ NEW STORE,

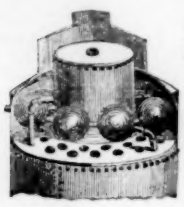
294 *BOWERY, Bet. HOUSTON & BLEECKER Sts.*

Their new Factory is now in full operation which will enable hem to fill all orders promptly. Their improved No. 2 and No. 8 Machines for Family and Manufacturing purposes are not only equal but superior to any other machine in market.

EMPIRE SEWING MACHINE CO.,

294 *BOWERY, NEW-YORK.* (206

DAVIS' PATENT SAFETY Steam Superheating Boiler,



Requires only 25 lbs. of coal per day to the horse-power. Are made of the VERY BEST IRON, double lapped and double riveted.

Being upright, occupy little space, and are easily cleaned.

Without additional fuel, the Superheater increases the working capacity of the steam 25 per cent., which has been fully demonstrated by the many now in use. (See illustrated circulars).

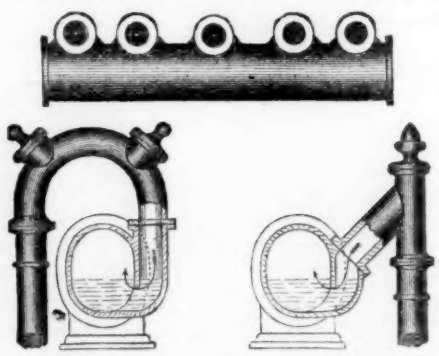
Address the

DUPLEX STEAM BOILER MF'G COMP'NY

Long Island City, N. Y.

STANLEY'S PATENT

HYDRAULIC GAS MAIN.



Whiting's Iron Foundry,

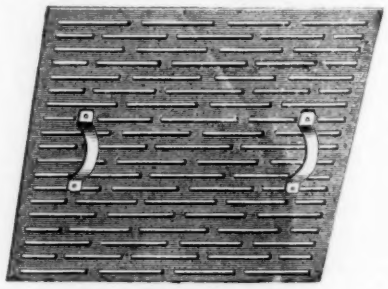
Kemble Street, Boston, Mass.,

Near the Boston Lead Works.

Castings for Gas Works, Street Mains for Gas and Water, Columns for Buildings, and Castings of all kinds made to order.

L. F. WHITING, Proprietor.

P. O. Address Roxbury, Mas 201-1 yr.



ARNOLD'S

METALLIC GAS TRAYS.

These Trays are made of sheet metal galvinized or tinned to prevent oxydization. Warranted to wear longer and to be cheaper in the end than any Tray known. They are light, cheap, easily kept clean, and almost imperishable.

Manufactured and sold by T. G. ARNOLD,

191-215.) 334a nd 336 West Twenty-first-st., N. Y.

P. P. DEILY, J. FOWLER.

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PENN.,

BUILDERS OF GAS-WORKS,

MANUFACTURERS OF

GAS-HOLDERS,

WROUGHT IRON ROOFS,
CHARGING-SCOOPS, COAL WAGONS,
COKE BARROWS, AND ALL WROUGHT
WORK CONNECTED WITH GAS-WORKS.

Particular attention paid to the Extension of Works and Repairs to Gas-Holders, Purifiers, Etc. Also, Builders of Water Tanks, Oil Tanks, Oil Stills, Etc.

REFER TO M. H. Jones, Easton Gas Co., Penn.
Franklin Woolman, Burlington Gas Co., N. J.
O. W. Goodwin, Camden Gas Co., N. J.
Benjamin Acton, Salem Gas Co., N. J.
Dr. Marcy, Cape Island Gas Co., N. J.
W. F. Warner, Owego Gas Co., N. Y.
E. Wilcox, Joliet Gas Co., Ill.
Messrs. Woodbury, Walter & Potter, Kalamazoo Gas Co., Michigan.
H. H. Fish, Utica Gas Co., N. Y.
W. J. Ball, Terre Haute, Indiana. (221-1yr.

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.
BANGS & HORTON, No. 31 Duane street, Boston.

Mines in Harrison County, West Virginia.

Wharves, Locust Point, Company's Office, 29 South street, } Baltimore.

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested. 204-1y

ARCHER & PANCOAST M'F'G CO.

Manufacturers of

GAS FIXTURES,

Coal Oil Lamps, Chandeliers, Etc.,

Of Every Description.

Manufactory & Warehouse, 9, 11 & 13 Mercer St.,

212) NEW YORK.

JESSE W. STARR & SONS,

Camden Iron Works,

Camden, New Jersey,

MANUFACTURERS OF

All kinds of Castings and Apparatus for Gas Works,

WROUGHT IRON ROOF FRAMES,

for Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS, for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves,

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

Telescopic and Single,

with cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS. STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

WROUGHT IRON WORK.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER.

F. H. ODIORNE

IMPORTER AND DEALER IN

PICTOU, SYDNEY LINGAN, NEWCASTLE, CANNEL AND WELSH COALS.

Agent for the New England States, for the sale of the

Delaware, Lackawana, and Western Railroad Company's Scranton Coal.

Cumberland Coal and Iron Company's George's Creek Cumberland Coal.

Penn Gas-Coal Company's Superior Gas Coal.

Also, Agent for the { Gowrie Mines, Cow Bay, International Co.,s Union Mines, Bridgeport, Acadia Coal Company, of Pictou. Little Glace Bay Mining Co. } Nova Scotia.

No. 146 Broad Street, Boston.

C. B. SWAIN,

No. 137 Front Streat, New York.

225-1

WANTED.

THE PRIVILEGE TO TEST A NEW PRINCIPLE in the process of Purification and Condensation of Gas, which materially lessens the cost of Purification.

Parties owning small Gas Works, who are willing to have this tested, after the test the addition will be sold or removed free of cost, will please communicate with the proprietors of this Journal.

GAS STOVES AND HEATERS.

HEATER NO. 3. HEATER NO. 4.

METROPOLITAN

Odorless Gas Heating and Cooking STOVES AND RANGES.

A. L. Bogart's Patent, Nov. 26, 1867.

The only inodorous Gas Heaters made in the world.
Salesroom, 702 Broadway, fourth door above Fourth st., N. Y.

NATIONAL FOUNDRY AND PIPE WORKS.

Office and Works—Carroll, Pike, Smallman and Wilkins Streets,

PITTSBURGH, PA.

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE, BRANCHES, CONNECTIONS, T's, ELBOWS, and ALL CASTINGS USED AT GAS AND WATER WORKS.

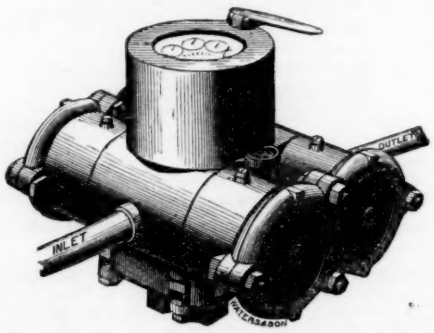
offer special inducements to parties wishing to purchase, my Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞ SEND FOR CIRCULAR AND PRICE LIST. ☜

149

H. R. WORTHINGTON'S



PATENT WATER-METER.

This Meter is also used for the measurement of Oil —it combines

ACCURACY, SIMPLICITY, and REMARKABLE DURABILITY with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.

HENRY R. WORTHINGTON,
61 Beekman steet, N. Y.

A RARE OPPORTUNITY

TO IRON WORKERS, TIN MEN OR GAS-FITTERS IN ANY OF THE GREAT CITIES.

The Editors of this Journal announce that they have made arrangements with the Patentee of the valuable inventions already described in these columns, and known as the Cambridge Gas Furnace, Gas Stove, Gas Oven and Gas Range, to secure their more general use and introduction; and that they are now authorized to lease or sell licenses for the manufacture and sale of the same, to responsible persons, on very favorable terms. For circulars and information, apply at this office.

☞ Our readers are assured that an opportunity for gres profit is herein presented. 208

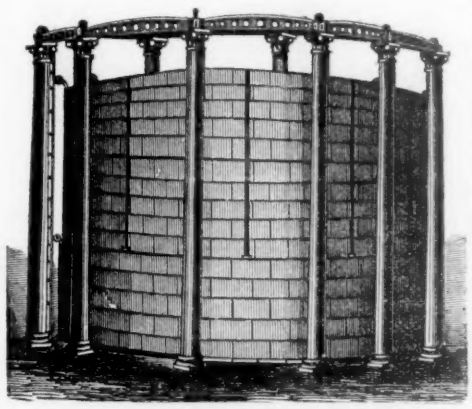
T. F. ROWLAND.

Continental Works,

Greenpoint, Brooklyn, N.Y.

NEW YORK OFFICE, 64 & 66 B'WAY, ROOM 33.

ENGINEER, AND MANUFACTURER OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch: Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

Professor HENRY WURTZ,

Formerly Chemical Examiner in the U. S. Patent Office, may be employed professionally as a SCIENTIFIC EXPERT. Geological Examinations and Reports, Analyses and Assays etc. etc., Practical Advice and Investigations in the CHEMICAL ARTS and MANUFACTURES. Invention and Examination of new chemical methods and products. Address 26 Pine street, rooms 35 and 36.
Hours, 12 to 3:30, P. M.

IMPORTANT TO GOLD AND SILVER MINERS AND COMPANIES.

PROFESSOR WURTZ,

Who is the inventor and Patentee of the new and wonderful uses of

Sodium in Working Gold and Silver Ores and Jewelers' Sweepings,

Will furnish at the above address information relating thereto together with experimental packages of

SODIUM AMALGAM

TO PARTIES ENGAGED IN MILLING ORES ONLY.

All preparations and instructions elsewhere obtained are spurious and unreliable.

A SYNOPSIS OF

BRITISH GAS LIGHTING

[To be Published August 1.]

"WINNOWED—The wheat carefully preserved, and the chaff thrown away."

This work will comprise the essence of the London *Journal of Gas Lighting*, from February 10, 1849, to December 31, 1867, and afford a succinct resume of the entire English Gas Engineering between these dates.

The excerpts will, as far as possible, be symmetrically arranged under the heads of Coals, Distillation, Purification, Volumetry and Photometry

It is to be executed by JAMES R. SMEDBERG, Engineer San Francisco Gas-Light Company. Subscriptions should be addressed to the offices of the AMERICAN GAS-LIGHT JOURNAL, 22 Pine-st. New York.

It will be issued only to subscribers.

It will be of great value, not only to Gas Companies and Engineers, but to those who represent the enormous collateral interests of Gas-Lighting—to Chemists, Gas Fitters and Patentees, as well as to scientific men generally.

The work will not be published until 200 subscriptions are received. Subscription price, $15

LABORATORY OF INDUSTRIAL CHEMISTRY, directed by Prof. H. Dussauce, Chemist.

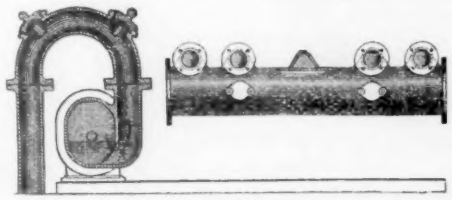
Advices and Consultations on Chemistry as applied to Arts and Manufactures, Agriculture, Metallurgy, etc. Plans of Factories, Drawings of Apparatus, Analyses of Ores, Manures, Mineral Water, and Commercial Assays in general.

Prof. H. Dussauce is ready to furnish information on the principal chemical manufactures such as soaps, candles, oils, petroleum, vinegar, matches, mines, etc., etc For further details address—

8 Professor H. Dussauce, Chemist, New Lebanon, N, Y.

STANLEY'S

HYDRAULIC GAS MAIN.



WILLIAM TAYLOR & SONS,

COLUMBIAN IRON WORKS,

Nos. 11, 13 & 15 Adams Street, Brooklyn, N. Y.

MANUFACTURERS OF ALL KINDS OF

Castings, Iron Buildings Store Fronts, Columns, Girders and Beams.

ALSO,

Gas Works Castings of all kinds.

Steam Engines, Mill Gearing, Hydraulic Presses for the manufacture of Linseed and Cotton Seed Oils, Sugar Mills, Single and Double Action Pumps, also Steam Pumps, Coal Oil Machinery, High and Low Pressure Boilers, Tanks, Kettles, Soap Curbs, &c.,

MADE AND REPAIRED AT THE SHORTEST NOTICE.

WM. TAYLOR. JAMES A. TAYLOR. EDWIN S. TAYLOR.

GLOUCESTER IRON WORKS,

GLOUCESTERCITY, CAMDEN COUNTY, N. J.,

MANUFACTURE

CAST IRON GAS AND WATER PIPE,

STOPVALVES FOR GAS OR WATER,

GASHOLDERS. 223

B. S. BENSON & SON,

ALLENTOWN, PA.,

MANUFACTURERS OF CAST IRON

GAS AND WATER PIPE,

AND FITTINGS FOR

GAS AND WATER MAINS, ETC.

Cast Vertically, in Lengths of 12½ Feet, and all Sizes from 3 to 80 inches.

Orders filled with Promptness and Despatch, and Warranted to give Satisfaction.

☞ Works and Office, Lehigh Valley, Allentown, Pa. 222-1yr

SCHOOL OF MINES,

COLUMBIA COLLEGE,

EAST 49th STREET, NEW YORK.

FACULTY:

F. A. P. BARNARD, S.T.D., LL.D., President.
T. EGLESTON, Jr., E. M., Mineralogy and Metallurgy.
FRANCIS L. VINTON, E. M., Mining Engineering.
C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.
JOHN TORREY, M.D., LL.D., Botany.
CHARLES A. JOY, Ph.D., General Chemistry.
WILLIAM G. PECK, LL.D., Mechanics.
JOHN H. VAN AMRINGE, A.M., Mathematics.
OGDEN N. ROOD, A.M., Physics.
JOHN S. NEWBERRY, M.D., Geology and Palaeontology.

The plan of this School embraces a three years' course for the degree of ENGINEER of MINES, or BACHELOR of PHILOSOPHY.

For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plain Trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. For further information and for catalogues, apply to

DR. C. F. CHANDLER
DEAN OF THE FACULTY.

80-1yr.

TURNBULL'S

AUTOMATIC PURIFIER.

STATE RIGHTS FOR SALE ON LIBERAL terms. For further information address by letter, WM. C. TURNBULL, care of I. C. Babcock, 59 Broadway, or to the Editors of this Journal.

THE AMERICAN METER CO.

Organizid under the General Manufacturing Laws of the State of New-York.

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE-PRESIDENT. RICHARD MERRIFIELD, SECRETARY AND TREASURER.

TRUSTEES:

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD, THOMAS C. HOPPER, Superintendent at Philadelphia.

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all articles in their line appertaining to the use of Gas Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of Workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty-Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West, Street, Boston, will meet with prompt attention

HARRIS & BROTHER,

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can quarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, Wm. Wallace Goodwin.

BIRD, PERKINS & JOB,

IMPORTERS OF

COAL FOR GAS, STEAM AND IRON MANUFACTURES.

Agents for the sale of the **Westmoreland** Coal Company's celebrated

GAS COAL,

and the Consolidation Coal Company's "Ocean Mine"

CUMBERLAND COAL.

Particular attention given to the charter of vessels at the lowest freights.

89 INDIA WHARF, Boston. 104 WALL STREET, N. Y. 184

B. S BENSON,

MANUFACTURER OF

CAST IRON PIPES AND FITTINGS

FOR

GAS AND WATER MAINS.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths.

Office and Factory 52 East Monument street.

BALTIMORE MD. [184

PREMIUM GAS STOVES.

New, Cheap Clean, Simple and Healthful.

No odor, no dirt, no soot, no ashes, no coal box. no punching and renewing fires.

THE CAMBRIDGE GAS STOVE.

This truly scientific invention received the premium at the State Fair at St. Louis, and is being introduced at the West and also in the New England States with great success. Certificates of its excellence and superiority from some of our most scientific and influential men have voluntarily given, and will be furnished upon application.

These stoves may be seen in operation at Messrs. Bliss & Co.'s, 95 Bleecker street, or at No. 22 Pine street, Room 10, where information may be obtained.

WORTHINGTON'S STEAM PUMP.

Extensively used by

GAS-LIGHT COMPANIES,

For sale at greatly reduced prices. Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.

Patent Gates for Water and steam-stops.

HENRY R. WORTHINGTON,
61 Beekman-st, New York.

BROOKLYN TUBE WORKS.

B. T. BENTON,

MANUFACTURER OF

WROUGHT IRON AND GALVANIZED

TUBES,

For Steam, Water, or Gas.

MANUFACTORY AND OFFICE,

Corner John and Adams Street, Brooklyn

ALSO

58 John Street New York. 171

WILLIAM S. CARR & CO.,

Successor to Sawyer & Co.,

SOLE MANUFACTURERS OF

Carr's Patent Water Closets,

SURINAL VALVE, &c.

Also Manufacturers and Dealers in PLUMBING MATERIALS OF EVERY DESCRIPTION. Plumbers' Brass Works, Earthen Ware, Pumps, Iron Drain Pipes, Traps and Sinks, Copper Bath Tubs, Showers, &c., &c.

MANUFACTORY, MOTT HAVEN.

106, 108, and 110 Centre Street, cor. Franklin.

NEW YORK.

Illustrated Catalogue and Price List sent on application

182-171

THE AUBIN BALANCED

VALVE WATER METER,

(Used also for Oils and Liquors)

IS NOW IN USE BY MANY CITY WATER Companies, because of its Low PRICE, SIMPLICITY, DURABILITY, ACCURACY UNDER ANY PRESSURE, and, (a great advantage,) because it runs with less head than any other meter used.

Manufactured by

H. Q. HAWLEY,
Albany, N. Y.

J. H. TIEMANN.

ANALYTICAL CHEMIST,

Metallurgist & Mining Engineer

☞ GOLD AND SILVER BOUGHT.

240 PEARL ST. Cor. BURLING SLIP, N. Y.

tf

DENNIS LONG & CO.,

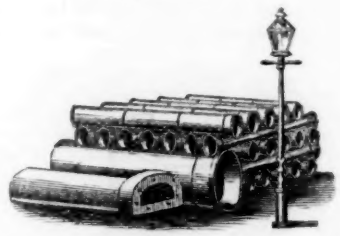
UNION PIPE WORKS!

LOUISVILLE PIPE FOUNDRY,

AND

Union Foundry and Machine Shops,

LOUISVILLE, KY.



MANUFACTURE

CAST IRON GAS AND WATER PIPE.

All Pipe Cast Vertically in Dry Sand.

2 inch Pipes in 8 feet lengths 3 inch to 60 inch cast in 12 feet lengths.

RETORTS AND MOUTH PIECES, LAMP POSTS CONDENSING PIPE, HYDRAULIC MAINS, PURIFIERS, DRIPS, ELBOWS, TS, CROSSES, SLEEVES, VALVES, &c., &c., &c.

GAS-HOLDERS.

And every description of work necessary for Gas or Water Companies.

Steamboat and all kinds of Steam Engines Blacksmithing and Heavy Castings. 223

S. FULTON & CO.,

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy & Light Castings of every description.

Penn Building, 412 Walnut street, between 4th and 5th streets, Philadelphia, Pa.

SAMUEL FULTON, THEO. TREWENDT.

STATE RIGHTS FOR SALE.

OF THE BEST PORTABLE SELF-REGULATING AUTOMATIC GAS MACHINE invented. Just patented, and the most perfect machine of the kind made. The gas gives a super or light to Coal Gas, at one third the consumption and cost of production. The process consists in generating Hydrogen with the vapor of a Hydrocarbon forming Olefiant Gas; is of simple construction and requires very little space. A fortune awaits the introducers. Send for circular.

227-1* C. F. DUNDERDALE, 90 Wall street.

West Fairmount Gas Coal Mines.

HENRY Y. ATTRILL, Proprietor.

Mines at Fairmount, Marion Co., West Va.

Oliver Jackson, Esq., Pres. First National Bank of Fairmount, Manager.

Wharves, Hankey's Locust Point, } Baltimore, Md.
Office, 35 S. Gay-street, }

I offer this superior coal to Gas Companies throughout the United States—SUPERIOR TO ANY. See analysis by Engineer Manhattan Gas Light Company of New York in the "Gas-Light Journal" vol. X., No. 218, p. 217. Orders solicited from Gas Companies, Gas Manufacturers, and shippers of Coal by the cargo. 215-3m

This coal, by analysis of Jos. A. Sabbaton, gave a yield of 9,681 cubic feet, and 9,500 cubic feet to the ton with an ILLUMINATING POWER of 19.50 CANDLES, AND 40 BUSHELS COKE.

THE AUBIN BALANCED

VALVE WATER METER,

(Used also for Oils and Liquors)

Is now in use by many City Water Cos., because of its low price, simplicity, durability, accuracy under any pressure, and (a great advantage) because it runs with less head than any meter used.

Manufactured by H. Q. HAWLEY, Albany, N. Y.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS.

[ESTABLISHED 1821,]

PHILADELPHIA,

Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,

GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

Gas and Steam Fitters' Tools, &c.

Stephen Morris. Stephen P. M. Tasker.
Thomas T. Tasker, Jr. Henry G. Morris

Office and Wareroom, 15 Gold-street, New York.

J. VAUGHAN MERRICK, W. H. MERRICK, JOHN E. COPE.

SOUTHWARK FOUNDRY,

FIFTH AND WASHINGTON STREETS,

PHILADELPHIA.

MERRICK & SONS, Engineers,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS MACHINERY.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gas-holders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof-Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron, Line Sieves for Purifiers, Hoisting Machines for Lifting Purifier Covers.

Address— MERRICK & SONS,
5th and Washington Sts, Philadelphia.

McNAB & HARLIN,

Manufacturers of

BRASS COCKS, PLUMBERS' BRASS WORK,

Globe Valves, Guage Cocks, Steam Whistles & Water Guages; Wrought Iron Pipes and Fittings

For team, Water and Gas.

Brass and Composition Castings.

☞ Getty's Patent Proving Pumps and Pipe Cutters. ☜
No. 86 John Street, New York. (212-6t

GEORGE C. HICKS & CO.,

Baltimore, Md.

MANUFACTURERS OF

Clay Retorts for Gas, Sugar Houses, Etc.

Fire-Proof Bricks and Tiles for both Clay and Iron Retorts; Fire Cement, Fire Mortar and Clay. Orders Promptly Filled.

GEORGE C. HICKS.
AUGUSTE LAMBLA, ZENO F. PARUS,

216-1 yr) Foremen of late J. K. Brick & Co., of Brooklyn, N. Y.

GEO. H. KITCHEN & CO.,

NEW PATENT

GAS APPARATUS

For Country Residences, Public Buildings, &c.,

FROM $300 UPWARDS.

EVERY DESCRIPTION OF GAS FIXTURES.

Gas Fitting in all its branches

591 Broadway NEW YORK.

MURRAY, BAKER & WALKER.

PRACTICAL BUILDERS

AND CONTRACTORS FOR THE

ERECTION OF GAS WORKS.

Manufacturers of all the latest and most improved

APPARATUS AND TOOLS

FOR THE

Manufacture and Distribution of

COAL GAS.

WORKS AT THE RAILWAY DEPOTS,

FORT WAYNE, INDIANA.

We manufacture Bench Castings, Washers, "The Immersed Multitubular," and Atmospheric Condensers, Wet and Dry-Lime Purifiers, Dry Center Seals, Telescopic and Single Gas Holders Wrought Iron Trussed Roof for Iron or Slate, Wood and Iron Trays for Purifiers, Coke and Coal Carts, Wrought Iron Screening Shovels, and Castings and Wrought Work of every description for Gas-works.

Mr. Walker's long experience as a Manager of gas-works renders the success of any system of Gas-Lighting which may be entrusted to his firm a matter of certainty.

He will wait personally upon any Association which contemplate the construction of new works, or the alteration or extension of old ones.

The most satisfactory references can be given, if required, of the experience and commercial fairness which characterizes our dealings.

We would respectfully invite Western men to call and see our patterns and works here. MURRAY, BAKER & WALKER,
198-1y Fort Wayne, Indiana,

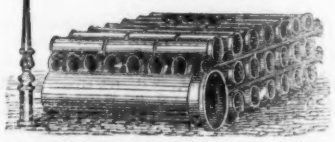
R. D. WOOD & CO.,

MANUFACTURERS OF

CAST-IRON PIPE, RETORTS, &c.

Office, 400 Chestnut Street,

PHILADELPHIA.



S. H. HENDERSON, Selling Agent,

No. 173 BROADWAY, 2ND FLOOR.

FINKLE & LYON'S

New Family

SEWING MACHINE

Should be known in

EVERY TOWN.

To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the FINKLE & LYON FAMILY SEWING MACHINE to any other, he can return it and have back his money.

This machine has taken many of the HIGHEST PRIZES; *is less complicated than any other first class machine; does a wider range of work without changing; requires no taking apart to clean or oil, no "lessons" to set needle, regulate tension or operate machine.*

Our new Manufacturing Machine is sold on the same terms as the Family Machine.

Please send for a circular with samples of sewing.

Finkle & Lyon S. M. Co.

No. 581 BROADWAY, NEW YORK.

T. G. ARNOLD,

MANUFACTURER OF

GAS-BURNERS,

And Importer of SCOTCH TIPS,

336 and 338 West 21st street,
formerly No. 447 BROOME ST.,
New York.

Mercury Cups, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

C. GEFRORER,

Manufacturer of

GAS-BURNERS,

For Lighting and Heating Purposes.

GAS HEATING AND COOKING APPARATUS; FITTERS' PROVING APPARATUS, &c.

529 Commerce st., bet. Market & Arch st., Phila., Pa.

OREGON IRON FOUNDRY

738, 740, 742 and 744,

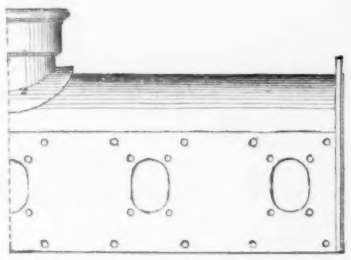
Greenwich Street, New York.

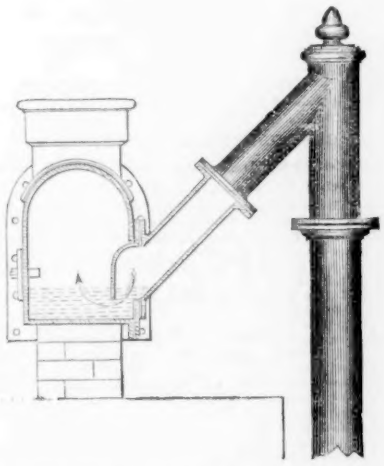
CASTINGS FOR

GAS WORKS

OF ALL DESCRIPTIONS, INCLUDING

Purifiers, Exhausters, Compensators, Self-Acting Valves, Branches, Bends, &c.





Floyd's Patent Adjustable Main.

FOR BENCHES OF 1, 2, 3, 5 and 6 RETORTS.

By the removal of the front plate only the Main can be adopted to Settings of any number of Retorts desired. The Patent Main can be applied to the ordinary D shaped Main. It offers great facilitie for cleaning, and is not liable to stoppage.

FLOYD'S PATENT

Malleable Iron Retort Lid.

SABATTON'S PATENT

Furnace Door and Frame.

REFERS TO—J. A. Sabattan, Esq., Engineer Manhattan Gas Co—Col. A J. White, Metropolitan Gas Co.—C. C. Mowten, Engineer New-York Gas-light Co.—J. Mowten Saunders, Engineer Baltimore Gas Co.—John T. Harrison, Engineer Savannah Gas Co.

.36] HERRING & FLOYD, Proprietors

SILAS C. HERRING. JAMES R. FLOYD

NEW PATENT PIANOS.

RAVEN & BACON.

(Established 1829.)

Warerooms Nos. 644 & 646 Broadway, N Y.

Manufacturers of Piano Fortes, with their Patent Combination Sounding-boards,

PATENTED AUGUST 14th, 1866

This invention, introduced exclusively into our Pianos, is of the greatest advantage to the tone of the Instrument, as it affects the sounding-board, the very soul of the Piano, and produces thereby a pure liquid tone greatly superior in quality and power to that of the ordinary Piano. The sounding-board released from its connection with the Piano case, and resting upon under sounding-boards, is relieved from the rigidity caused by such connection, and its vibratory quality increased. Our Pianos are first class in every respect, and purchasers will have not only our own guarantee as to their quality, but also the guarantee of the reputation of the instrument, obtained from the experience of our patrons who have used them for a generation. All lovers of this eminently household instrument, as well as parties proposing to purchasenew Pianos, are invited to call and examine our assortment.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS.

ESTABLISHED 1821,

Offices 209 South 3rd Street, Philadelphia, and 15 Gold Street, New York.

FOR GAS WORKS MACHINERY, ADDRESS 209 SOUTH THIRD STREET, PHIL.

Manufacturers of Wrought Iron Tubes for Gas, Steam and Water, Lap-welded American Charcoal Iron Boiler Tubes, Iron and Brass Fittings, and Gas and Steam Fittings of every description.

Especial attention is called to our IMPROVED COAL GAS MACHINERY.

REFERENCES—Detroit Gas-Light Company, Michigan: Elizabeth Gas-Light Company, N. J.; Hudson City Gas-Light Company, N. J.; New Brunswick Gas-Light Company, N. J.; Lancaster Gas-Light Company, Pennsylvania; Williamsport Gas-Light Company, Pennsylvania; Elmira Gas-Light Company, N. Y.; Chicago Gas-Light and Coke Company, Illinois: also a number of other Companies.

STEPHEN MORRIS, THOS. T. TASKER, JR., STEPHEN P. M. TASKER, HENRY G. MORRIS.

Advertising Index.

☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

GAS-BURNERS, APPARATUS ETC.

Arnold's Metallic Gas Trays—T. G. Arnold, 334 and 336 West 21st street, N. Y. 6
American Meter Company, 512 West 22d street, New York 8
Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the AMERICAN GAS-LIGHT JOURNAL 7
American Self Gas Lighting Torch and Improved Key—J. W. Barlett, 569 Broadway, N. Y. 8
Builder of Gas Works, Apparatus, Etc.—P. P. Deily, 39 Laurel street, Philadelphia 6
Cambridge Gas Stoves, Ranges, &c.—Gas Light Journal Offices, 8
Contractors for Gas-Works, Etc.—Murray, Baker & Walker, Fort Wayne, Ind 9
Gas Retorts, Etc.—George C. Hicks & Co., Baltimore, Md 9
Gas Fixtures, Etc.—Archer & Pancoast Manufacturing Co., 9, 11 and 13 Mercer street, New York 6
Gas Fitters' and Plumbers' Materials—McNab & Harlin, 86 John street, New York 8
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York 8
Gas Engineers and Contractors—Hoy, Kennedy & Co., 111 Liberty street, New York 5
Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa 9
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry street, Philadelphia, Pa 8
Gas Apparatus, &c.—Geo. H. Kitchen & Co., 561 Broadway 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. 9
Gas Stoves—A. L. Bogart, 792 Broadway 7
Gas Fixtures & Chandeliers—Alfred Bliss & Co., 95 Bleecker-st., New York 5
Gasometers, Etc—George Stacey & Co. Cincinnati, O 6
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway 4
Gasholders, Etc.—Deily & Fowler, 39 Laurel street, Philadelphia 2
Gas and Steam Coal ..Youghiagheny Coal Hollow Coal Co., 423 Walnut street, Phil'a. 2
Gas and Water Pipes—R. D. Wood & Co., Phil. 8
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa. 2
Gas Coals—F. H. Odiorne, 146 Broad st., Boston, or C. B. Swain, 137 Front street, N. Y. 6
Hydrocarbon Light and Gas Improvement Company, Office 74 Malden Lane, New York
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J 5
Ludlow Valve Mf'g Co., 139 River street, Troy, N. Y 3
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Ave. C., N. Y 5
Patent Gas Exhauster—Smith & Sayre, 484 Broadway 4
Purification of Gas by Oxide of Iron—W. H. St. J hn and Peter Cartwright, N. Y. Gas Works, 21st Street and Av'e A 3
Stanley's Hydraulic Main, Etc.—L. F. Whiting, Boston 6, 7
Valve Gas Burner—Avery & Co., Springfield, Mass 5
West Fairmount Gas Coal Mines, Office, Baltimore Md. 9
Wooden Gas and Water Pipe—Wyckoff Bros. & Co., Elmira 4

FOUNDRIES.

Brooklyn Tube Works—B. T. Benton, Brooklyn 9
Columbian Iron Works—Wm. Taylor & Sons, 11, 13 and 15 Adams street, Brooklyn, N. Y. 7
Cast Iron Pipes and Fittings—B. S. Benson, 32 East Monument street, Baltimore, Md. 8
Continental Works—T. F. Rowland, Greenpoint 7
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons 6
Fire Proof Brick Works, Baltimore, Md.,—John S. & George R. Berry. 2
Gloucester Iron Works, Camden, N. J. 7
Keystone Iron Works 4
Louisville Pipe Works—Dennis Long, Cor. 9th and Water-sts., Louisville, Ky. 8
Manufacturing Enamelers—Nessle & Taylor, 97 Water street, Brooklyn, N. Y. 5
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman and Wilkins streets, Pittsburgh, Pa 7
Oregon Iron Foundry—Herring & Floyd, 738, 740, 742 and 744 Greenwich street, New York 9
Pascal Iron Works—Morris, Taskar & Co., Philadelphia, Pa. 9
Southwark Foundry—Merrick & Sons, Fifth and Washington streets, Philadelphia 9
Wrought Iron Pipes, etc.—Joseph Nason & Co., 61 Beekman street, New York 5

WATER METERS, PUMPS, ETC.

Ashcroft's Low-water Detector, 50 John street, New York 6
Aubin Water Meter—H. Q. Hawley, Albany, N. Y. 8
Cast Iron Pipes for Water and Gas—Riley A. Brick, 89 White street, N. Y. 2
Davis' Steam Superheating Boiler—Duplex Steam Boiler Mf'g Company, Long Island City, N. Y. 6
Steam Pumps—H. R. Worthington, 61 Beekman st. New York 8
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 139 River street, Troy, N. Y. 3
Water Pipes, etc.—S. Fulton & Co. 207 North Water st Phila. 8
Water Closets, etc.—Wm. S. Carr & Co. 149, 151, 153, 155, 157 Centre street, New York 8
Worthington's Water Meters—H. R. Worthington, 61 Beekman street, New York 7

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, Etc., 58 Goerck street, New York 5
Bay State Clay Retort Works, 125, 127 Water st. Boston, Mass. 6
Brooklyn Clay Retort Works, Van Dyke st. Brooklyn, N. Y. 5
Jersey City Fire Brick Works.—J. H. Gautier & Co., Greene, Essex and Bergen streets, Morris Canal Basin, N. J. 5
Laclede Fire Brick Works, 1007 North Levee, St. Louis, Mo. 5
Manhattan Clay Retort Works, 15th st. near Av. C, New York 5
Philadelphia Fire Brick Works, Vine and 23d sts. Philadelphia. 5
Retorts, Pipes, &c.—R. D. Wood & Co., 400 Chestnut street, Philadelphia 3

MINING MACHINERY, ETC.

Broker in Mining Stocks—C. H. Smith 145 B'way, New York 4
Industrial Chemistry—Prof. H. Dussauce, New Lebanon, N. Y. 7
Mining Engineer—J. H. Tiemann, 240 Pearl st. New York 8
Sodium Amalgam &c.—Prof. Wurtz, 26 Pine st., New York 7
School of Mines, Columbia College, East 49th st.

LAMPS, STOVES, PETROLEUM, ETC.

Lamps, &c.,—Julius Ives & Co., 49 Maiden Lane, N. Y. 2

MISCELLANEOUS.

Analyses of Coals, Minerals, Mineral Waters, 26 Pine st., N. Y. 3
A Rare Opportunity for Investment—Offices of this Journal 7
Books on Coal Gas—William Wood & Co., 61 Walker street, New York 3
Despard Coal, 32 Pine street, N. Y. 6
Engineers and Contractors—R. M. Fryer & Co., 296 Broadway, New York. 2
Finkle & Lyon Sewing Machine Company, 581 Broadway 9
Fodell's "Book-keeping for Gas Companies" 2
Gas-Light Journal American and Foreign Patent Agency 8
Graham's Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or Editor of American Gas-Light Journal 9
New Method for Lighting and Extinguishing Street and other Elevated Gas Lamps 2
Professor Henry Wurtz—Office Gas-Light Journal 2
Prince's Metallic Paint—D. Sloan & Co. 115 Liberty street 5
Patent Lamp Post—Am. Gas-Light Journal, 28 Pine street 5
Pianos—Raven & Bacon, 644 and 646 Broadway, N. Y. 9
Patent Instantaneous Gas Lighter—J. W. Bartlett, 569 Broadway, New York 9
Smedberg's "Synopsis of Gas-Lighting" 7
Smith & Sayre Manufacturing Company, 95 Liberty street 4
Shackelton's System of Heating—22 Pine-st., Room 10, N. Y. 6
Sellars Cement for Repairing Broken Fire-clay Retorts, etc. etc. Herring and Floyd, 742 to 746 Greenwitch street N. Y. 2
The Newburgh Orrel Coal Company—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7 2
Works Upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y. 3

Inventors' Department.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:

On filing each Caveat	$10
On filing each application for a Patent except for a Design	15
On issuing each original Patent	20
On appeal to Commissioner of Patents	20
On application for Re-issue	30
On application for Extension of Patent	50
On granting the Extension	50
On filing a Disclaimer	10
On filing application for Design (3½ years)	10
On filing application for Design (7 years)	15
On filing application for Design (14 years)	30

GAS-LIGHT JOURNAL AMERICAN AND FOREIGN PATENT AGENCY.

M. L. CALLENDER & CO., Proprietors of the AMERICAN GAS-LIGHT JOURNAL, having perfected arrangements, are now prepared to offer their services to inventors as Solicitors of

American and Foreign Patents.

We have associated with us parties who have been directly connected with the Patent Office for many years, and have acquired an experience in Patent matters of over *twenty* years.

We have also unusual facilities for obtaining Patents in the various European countries with *certainty and despatch.*

Oral and written opinions as to whether inventions contain features of patentable novelty, will be given upon personal or written application, *free of charge.*

We supply finished drawings by the best artists, and where necessary the model also. A circular, containing a list of fees and other valuable information as to the preliminary steps to be taken in obtaining Patents at home and abroad, will be furnished by addressing

M. L. CALLENDER & CO.
Solicitors of Patents, 22 Pine street.

To Inventors and Patentees.

This JOURNAL, circulating, as it does, throughout the United States, Canadas, and portions of Europe, is a superior medium for advertising.

Upon receipt of $3 we will send the JOURNAL one year, and give a description of any new invention in a space not to exceed ten lines in the "Inventors' Department."

We also take out Patents in the United States and Europe, obtain Extensions, and make a *Specialty* of difficult and abandoned cases.

M. L. CALLENDER & CO.,
No. 22 Pine street, New York.

THE AMERICAN GAS-LIGHT JOURNAL.

AND

CHEMICAL REPERTORY,

is published at No. 22 Pine Street, opposite the Sub-Treasury Building on the 2d and 16th of every month, and is a recognized official organ of—

LIGHT, HEAT MINING INTERESTS,

PETROLEUM, WATER-SUPPLY, AND

SCIENTIFIC SUBJECTS GENERALLY.

TERMS.

SUBSCRIPTION—Three dollars per annum in advance.

AGENTS

NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau street.
BOSTON—S. M. PETTENGILL & Co., No. 6 State Street.
PHILADELPHIA—COE, WETHERILL & Co., Ledger Building, Phil'a.
Germany.....B. WESTERMAN & Co., of New York.
Great Britain....TRUBNER & Co., 60 Paternoster Row, London
France.....LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonnière
Brussels, Belgium—HENRI BERGE.

☞ All communications to be addressed to "The Editors," No. 22 Pine Street, New York.

AUG 13, 1870